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VIA Rail Canada

An Analysis of VIA's Potential in Fulfilling Rail Passenger Policy Objectives

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THIS IS THE UNEDITED TEXT OF A WORKING PAPER PREPARED FOR THE SCIENCE COUNCIL COMMITTEE ON OPPORTUNITIES IN CANADIAN TRANSPORTATION, AND THE ONTARIO TASK FORCE ON PROVINCIAL RAIL POLICY.

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VIA RAIL CANADA: AN ANALYSIS OF VIA's POTENTIAL IN FULFILLING RAIL PASSENGER POLICY OBJECTIVES

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ABSTRACT

This paper discusses the potential of VIA Rail Canada Inc. in fulfilling rail passenger policy objectives. The preliminary analysis reported here is based primarily on current and future perspectives on economic, technological and service factors of the passenger railway managed by VIA, although other wider concerns have been taken into account.

At the outset, the present status (service, economic performance) of passenger train services in Canada is discussed. In addition to user statistics, analyses are reported on the revenue and cost structure of passenger railway. Furthermore, modal comparison of service, costs and financial losses are presented for the Windsor-Quebec City corridor so as to put the railway service and financial performance in proper perspective.

In an attempt to highlight rail policy requirements, a brief review of the 1976 rail policy is presented and VIA's mandate is discussed. This leads to an examination of the framework for the provision of passenger train services and the associated problems that VIA is encountering in the course of fulfilling its mandate.

Finally, on the basis of available information, an assessment of VIA's potential in fulfilling the objectives of the passenger rail policy is carried out under three service contexts (options). These are: the status quo option, the option of major service abandonments, and the incremental system modernization option. Management, economic and technological factors are treated and whenever relevant, international comparisons are made.

Results show that while the status quo option is not favourable to VIA, the option of major service abandonments, at least in an extreme form, implies disbanding VIA Rail Canada altogether. Even under the incremental system modernization option, although the most favourable, in relative terms to passenger railway, VIA will not be able to achieve the standards of economic efficiency and the containment of financial losses achieved in many other industrial countries of the world.

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CHAPTER I

INTRODUCTION

I.1 Background

Prior to and since the announcement in 1976 of the passenger rail policy by the Federal Government, passenger rail service management and financial performance have been viewed as "problem areas" in Canadian transportation. In spite of the fact that since 1975 the trend of declining ridership has reversed, many interest groups have in recent years expressed dissatisfaction with passenger railway in Canada. (1,2,3,4)

As a result of public hearings on Transcontinental Passenger Train Service, the Canadian Transport Commission identified a number of critical problems as perceived by the Public: (4)

> "Many constructive proposals emerged. These dealt with a variety of problems related to equipment, roadbed, scheduling, reservations and mangement, with the same themes emerging over and over again. This suggests that many of the problems perceived by citizens are in fact more real than apparent and this was found by the Committee to be a very useful way in which to identify and attempt to come to grips with these issues".

From available information, it is possible to identify problems associated with passenger railway as viewed by the interest groups involved. See Table I.1. The travelling public is concerned with the level of service (i.e. slow speed and inconvenient service in terms of frequency and schedules) and the quality of equipment used especially during peak season on some routes. (2,3,4,5)

VIA Rail Canada Inc., Canada's new crown corporation (established in 1977) is also experiencing a number of technical, management and institutional problems in discharging its role of providing passenger train service. (6) VIA, which in 1978 became totally responsible for those passenger rail services previously operated by CN and CP Rail, has concerns that relate to the problems of providing modern passenger train services with obsolete equipment and within a freight-oriented railway plant, as well as to the legislative, institutional and management framework within which it operates. Furthermore, there is concern over lack of resources for equipment modernization and infrastructure improvements.

Public and special interest groups have also voiced their concern with passenger railway. The Consumers Association of Canada complained to the Canadian Transport Commission (CTC) about VIA's fare policy. (6) Passenger surveys indicate that a substantial number of short haul rail passengers (e.g. 40% in the Maritime provinces) make their trip for non-discretionary purposes, and that a large proportion of short haul travellers do not have alternative means of travel. (5)

Transport 2000, a public interest group, appears to be convinced of the merits of passenger railway for the provision of services of suitable quality at substantial savings in energy and other costs. Their concern centres around their perception of government's lack of public interest approach with regard to railway transportation. (8)

Communities and special interest groups across Canada are concerned about the possibility of service abandonment such as local/regional and transcontinental trains and consequent loss of a travel alternative as well as railway jobs. (2,9,10,11) The intercity bus transportation industry, still another impact group, has recently voiced opposition to VIA's marketing and fare policies.(12) Railway employees are logically interested in safeguarding their interests in train service rationalization and consequent dislocations.

The Federal Government is faced with a very high degree of subsidization. Presently, revenues cover less than one-third of total costs. Total deficit paid by the Federal Government in 1979 was about 232* million dollars.(6) In the case of passenger train services, the merits of federal subsidies are largely unexplored. As elaborated later in this paper, the Federal Government is interested in providing convenient, attractive passenger train services at minimum cost.

Provincial governments are beginning to develop their perspective with regard to rail transportation.(13,14) While a common viewpoint has not been expressed, their concerns relate to improvement of rail service, continuation of passenger train as a travel alternative and a mode with energy conservation potential. There are indications that some provincial governments may be willing to support railway passenger services that are in the provincial and regional interest.

At a recent federal-provincial meeting, the Ontario government proposed that the current program to modernize rail facilities should be accelerated to improve the productivity and efficiency of the total system for passenger and freight transportation. As a part of railway modernization, a high speed (125 mph) passenger service on an exclusive track basis in the Windsor-Quebec city corridor was recommended. Among other benefits (i.e. industrial effects, system efficiency), the creation of 1200 jobs for 5 years was highlighted.(15)

1.2 Objectives of This Paper

This paper reports a preliminary analysis of VIA's potential in fulfilling rail passenger policy objectives by taking into account the concerns of the various interest groups in general and the concerns of users and the governments in particular.

The approach followed in this analysis is that of describing first the present status (i.e. service, economic performance) of passenger

* 1979 subsidy paid by the Federal Government has also been stated to be about 270 million dollars.

railway in Canada. (See Chapter II). The rail passenger policy requirements and VIA's present mandate are described next in Chapter III. This leads to the examination of the framework for the provision of passenger train services and the associated problems (Chapter IV). Finally, on the basis of available information, VIA's potential in fulfilling passenger rail policy objectives (and overcoming the problems) is assessed in Chapter V.

CHAPTER II

PASSENGER RAILWAY SERVICE AND ECONOMIC CHARACTERISTICS

II.1 User Statistics

The utilization of passenger trains, due to deterioration of the railway system and dramatic improvements in competing modes, declined considerably following the end of Second World War and reached a low of 2.0 billion revenue passenger-miles in 1961 (Figure II.1). As a result of the introduction of promotional fares in 1962 and 1963, the railways regained a considerable amount of passenger traffic, reaching a high of 3.1 billion passenger-miles in the Expo year of 1967. Since 1967, passenger-miles have declined again. The utilization for 1973 is very low due to rail strike. Since 1975, rail passenger utilization has shown improvement.

In 1972, 5.91 million passengers used the trains. In 1974 the train ridership dropped to 5.18 million. In recent years, however, passenger handling has been increasing (10% in 1977, 12% in 1978, 5.4% in 1979).(18,19,5) The patronage for 1978 and 1979 was 5.60 and 5.95 million passengers, respectively. Since 1977, the year of VIA's formation and the introduction of its marketing compaign (September 1977), the number of train passengers has increased each year, for a total increase of 1.5 million passengers or 34% increase in passenger ridership. (6)

Railway passenger miles show a similar trend. Since 1975, passenger miles served by the railway have increased. See Figure II.1.

Passenger travel by railway forms only a very small part of overall travel activity (Table II.1). In 1977, only 1% of passenger-miles were produced by rail. The other 99% of modal outputs were: bus and urban transit 2.5%, air 12.5%, and automobile 84%. The rail mode experienced a decline in market share from 3% in 1965 to 1% in 1977. In terms of actual number of passenger miles, in 1977, 1.75 billion passenger miles were produced by passenger railways in Canada.

Trains are more successful in attracting passengers to short haul services (i.e. up to 500 miles) than long haul service. As shown in Table II.2, 50% of rail's total ridership in 1975 was on services of up to 500 miles distance. (22)

Passenger train routes in Canada are generally segregated into groups reflecting the roles that intercity railway passenger services fulfill. These are: intercity services in the Windsor-Quebec City corridor, transcontinental services, other intercity, regional and local services, and remote services where no alternative surface modes exist.

Trains in the Windsor-Quebec City corridor carry over one-half of all passengers but, due to shorter trip lengths compared to the transcontinental routes, account for only one-third of the passenger miles. On the other hand, the transcontinental trains carry less than one-third of all train passengers but serve over 50% of passenger miles. (21)

For a number of selected city pairs in the Windsor-Quebec City corridor, Figure II.2 shows modal shares (as % of total traffic) of passenger travel. The effect of distance on modal usage is quite clear. Rail's share of traffic (within the short haul range) generally improves with distance.

Average load factors on the transcontinental and Windsor-Quebec City corridor are at about 45% level whereas all other services show about one-half the loading levels of corridor and transcontinental trains. (21) The overall average load factors in 1972, 1976 and 1979 were: 43.7%, 39.0% and 43.9%. The load factors declined from 1972 to 1977, but the trend has reversed since 1977.

II.2 Service and Economic Factors

Most passenger rail services in Canada are at present provided by VIA Rail Canada Inc. Other railway companies provide limited train service with very small passenger ridership. VIA took over from CN and CP a rail network that served 1200 locations (coast to coast). Most equipment was more than 25 years old. In 1979, VIA provided 46 train services and employed 3,878 persons. It should be noted that VIA owns all passenger equipment used in operating its services and employs all personnel engaged for the provision of rail passenger services (direct employment) except the operating crews of trains. (6,18,19)

Cost and revenue trends of passenger railway shown in Tables II.3 to II.5 suggest a declining revenue/cost ratio in all markets until 1977. Since 1978, however, an improvement in revenues vs. costs has occurred. The 1979 statistics shown in Table II.3 reflect such an improvement for the overall railway system.

Windsor to Quebec City corridor services in aggregate show the highest revenue to cost ratios (38% in 1977 versus 28.6% for overall system and 27.9% for the transcontinental services). (See Tables II.3 and II.4). In Table II.5, 1977 revenue to cost ratios are given for all services including those that were discontinued as a result of service rationalizaation. The revenues received for regional and remote services are very meagre in comparison with costs of providing these services (i.e. 13.6% and 11.4% respectively).

In 1977, 54% of all losses were due to the Transcontinental train service. Corridor trains were responsible for 26.6% of losses, local and regional 14.9%, remote trains 3.8%, and discontinued trains were responsible for 0.7% of total losses.

Reasons for the poor financial performance of passenger trains are discussed throughout this paper. Here, it should suffice to suggest that inflationary effects of cost escalation, lack off innovative cost control, inefficient equipment, poor matching of service supply with demand, declining passenger revenues due to lack of marketing, the segregated CN/CP management of the system, and the lack of capital contributed to the decline in financial performance. Another reason for poor financial performance is the decline in ridership caused by competition from superior automobile and air modes.

Although the financial performance of passenger railway has recently exhibited a slight improvement, it has a long way to go before it can be regarded as satisfactory. Examine summary statistics for 1972 and 1979 presented in Table II.6. These two years appear quite comparable in terms of passengers and load factors but passenger miles in 1979 were 4% below the 1972 level and average trip length was 4.6% below the 1972 level. Revenue as a percent of cost in 1979 was 6.6% below the 1972 level. The break-even load factor had increased from 117% to 142.4%. The loss per passenger mile in constant dollars had increased by 11.7%. This implies that costs have been growing much faster than revenues.

For the Windsor-Quebec City corridor, rail services, traffic, revenue and cost statistics are illustrated in Tables II.7 and II.8. Passengers and passenger-miles declined from 1972 to 1975 but showed improvement since 1975. Since 1975, both the passengers and passenger-miles have been growing at the rate of 6% per year until 1977. Since 1977, growth rates have improved.

In the Windsor-Quebec City corridor, load factors declined from 47% in 1972 to 38% in 1974 to 1976. The 1977 load factor showed slight improvement. Average trip length in the corridor has increased steadily from 1972 to 1975 but has declined slightly since 1975.

In the corridor, while revenue per passenger in constant dollars has increased by 6% (in the 1972-77 period), revenue per passenger mile declined by 2%; per seat-mile the decline was 18% (Tables II.7 and II.8). During the same time period (1972-77), in constant dollars, cost per passenger increased by 60.7%, cost per passenger-mile increased by 44.8% and cost per seat-mile increased by 19.5%. The higher cost per passenger-mile in comparison with cost per seat-mile is a reflection of reduced load factor.

Recent improvement in passenger ridership has been attributed to a combination of such factors as energy price escalation, air fare increases and passenger railway promotional efforts. (24,25) Ridership increases have improved the revenue intake of passenger railway. However, costs have risen faster than revenues, resulting in a continued escalation of losses. Cost increases reflect higher labour costs, higher fuel prices, poor equipment utilization, increase in service frequency without adequate market research and promotional efforts, and higher maintenance and overhead costs.

In order to gain a better understanding of financial and service characteristics, two corridor train services, namely Montreal-Toronto and Montreal-Ottawa, were selected and analyzed. These were selected from the perspective of contrasting performance in service and economic terms.

The Montreal-Toronto train service is the heaviest travelled link in the corridor and in comparison with Canada's other services, it shows the best financial performance. (Table II.9). Revenue passengers increased in recent years but were still low compared to 1972. Average trip length and revenue passenger miles have increased steadily over time. Load factor dropped during the 1972-77 period (56.1% to 50.2%) but showed considerable improvement in 1978 (61.7%).

Costs of Montreal-Toronto service as compared to revenues increased considerably. The end result was a declining revenue to cost ratio (63.5% in 1972 to 48.3% in 1978). The breakeven load factor increased from 88.4% in 1972 to 127.7% in 1978. Labour costs as a percent of total costs declined from 58.8% in 1972 to 49.2% in 1978. Loss per passenger-mile in constant dollars increased in the 1972-77 period but declined in 1978. Loss per seat-mile (in constant dollars) increased from 1972 to 1977 but stabilized in 1978. It is interesting to note that in 1978, the latest year for which statistics of the type shown in Table II.9 are available, revenues generated by the Montreal-Toronto service did not cover even the labour costs incurred.

The second service in the Windsor-Quebec City corridor analyzed in detail is that of Montreal-Ottawa (Table II.10). Passenger traffic and passenger miles, after a drop in 1974, increased steadily. The average trip length and load factor dropped until 1977 but increased in 1978. The increase in trip length in 1978 could be due to VIA's fare policy of discouraging short distance trips. Revenues as a percent of cost dropped from 40.1% in 1972 to 23.9% in 1978. The break-even load factor increased from 125% in 1972 to 154.8% in 1978. Both the revenue/cost ratio and the break-even load factor showed improvement in 1978 over the 1977 level.

Labour costs of Montreal-Ottawa service as a percentage of total costs have declined slightly over time. (Table II.10). Loss per passenger-mile in constant dollars has increased dramatically (77.6% increase in the 1972-78 period) while loss per seat-mile in constant dollars during the same time period increased by 31.6%. The 1978 loss per passenger-mile for the Ottawa-Montreal service is more than three times that of Toronto-Montreal.

Two other train services, namely the Montreal/Toronto-Vancouver transcontinental service and the Sydney-Halifax regional link were selected as well for a detailed analysis of their service and financial characteristics. See Tables II.11 and II.12.

In the case of Montreal/Toronto-Vancouver train service, passenger traffic and passenger-miles dropped from 1972 to 1974 but showed an

increase in 1978. (Table II.11). Available statistics suggest short distance (local) traffic increases (e.g. Toronto-Barrie). Due to incomplete data, an assumption was made that the 1978 load factor is the same as that of 1974, which is considerably lower than the 1972 load factor. Revenue as a percent of costs declined from 37.0% to 26.5% in the 1972 to 1978 period. The break-even load factor increased from 141.3% in 1972 to 177.4% in 1978. From 1972 to 1978, loss per passenger mile and seat-mile, in constant dollars, increased by 14.7% and 5.1% respectively.

Table II.12 shows traffic and financial data for the Sydney-Halifax service. Revenue passengers and passenger-miles increased from 1972 to 1974 but dropped in 1978 as compared to 1974. Average trip length and load factor declined from 1972 to 1978. Revenue as a percent of cost dropped from 1972 to 1974, and the 1978 ratio is almost the same as that of 1974. Although not shown in Table II.12, the % revenue/cost dropped to a low of 18.5% in 1977. Break-even load factor dropped from 104.2% in 1972 to 89.6% in 1978.

Labour cost of the Sydney-Halifax train service as a percent of total cost declined from 62.7% in 1972 to 49.8% in 1978. Loss per passenger-mile, although increased in 1978, dropped slightly (4.6%) in constant dollars. Similarly, loss per seat mile in constant dollars increased from 2.9¢ in 1972 to 3.4¢ in 1974, but decreased to 2.3¢ in 1978, which is 20.7% less than 1972 level.

II.3 Analysis of Revenues and Costs

Passenger revenues are of course a function of fares charged and passenger travel volume. While a number of fare types are charged depending upon the time, travel season and other factors, there is a relationship between fare and distance. For short distances, higher rates (¢/mile) are charged and fare rates drop as a trip length increases.

A number of factors affect passenger railway costs and losses. In addition to the type and quality of equipment and infrastructure, factors such as travel volumes carried, load factors and distances affect costs and losses. For short haul travel context of Windsor-Quebec City corridor, available data permits a study of volume, distance and load factor effects on costs and losses. See Table II.13. Information contained in this table is used as a basis for the illustration of trends in the variation of cost per passenger-mile versus total passenger volume (Figure II.3) and cost per passenger-mile versus distance (Figure II.4). Although other factors affect costs, the general trend is quite clear. Costs per passenger-mile decline with increasing distance (within the short haul range) and volume of passengers, all else being the same.

Financial loss per passenger-mile and per seat-mile for the corridor passenger railway services are shown in Table II.14 and illustrated in Figures II.5 and II.6. These drawings suggest that

losses decline for those passenger railway services that serve higher traffic volumes and are of proper trip lengths.

Of all cases examined in Figures II.3 to II.6, it is clear that the Toronto-Montreal service, in relative terms, has the best economic performance. Losses are also relatively low for Toronto-London/Sarnia, Toronto-Windsor, Ottawa-Brockville-Toronto and Toronto-Kingston. However, there are a number of services which, in comparison to others show excessive loss rates (i.e. ¢/passenger-mile). These include Ottawa-Belleville (Toronto), Montreal-Quebec (CP) and Toronto-Stratford.

II.4 Passenger Railway Cost Structure

In order to appreciate reasons for escalating costs, it is instructive to examine in detail the cost structure of selected railway passenger services. It should be noted that cost calculations and reporting by railways are carried out in accordance with the CTC's railway costing order R6313. The basis of cost estimates in R6313 is reliance on relationships developed from historic data and the use of network-wide averages. It is generally recognized that the use of such cost estimates developed from the application of R6313 is inappropriate for planning purposes.

Table II.15 presents passenger train cost structure for the overall Windsor to Quebec City corridor (1976) and the two selected services, namely those of Toronto-Montreal (1978) and Ottawa-Montreal (1978). Costs are classified here according to: train related (direct) costs; fixed plant and train control costs; administrative, benefits, taxes; and depreciation and cost of capital.

A number of interesting inferences can be drawn from these cost data. Labour expenses account for almost half the total costs (49.2% for Toronto-Montreal, 55.6% for Ottawa-Montreal). Train-related labour costs account for about one-half of all labour costs. Fuel costs as a percentage of total costs are 3.6% for the overall corridor, 4.4% for Toronto-Montreal and 2.5% for Ottawa-Montreal. In terms of differences in the cost structure of the two corridor services, it appears that much higher labour costs are incurred on the Ottawa-Montreal service as compared to the Toronto-Montreal service (55.6% vs. 49.2%). Depreciation and cost of capital is also somewhat higher for Ottawa-Montreal as compared to Toronto-Montreal (8.9% vs. 6.5%). A possible reason for a low level of depreciation and cost of capital expenses for Toronto-Montreal service could be the separate cost account for Turbo expenses.

Presented in Table II.16 are the cost details for selected non-corridor services, namely the Montreal/Toronto-Vancouver (trans-continental) service and Sydney-Halifax (regional) service. Labour costs as a percentage of total costs are: 52.8% for the Montreal/Toronto-Vancouver service and 50.2% for the Sydney-Halifax service. Train related labour costs are a major cost item, i.e. 28.4% for

Western Transcontinental train and 20.5% for Maritime (regional) service. Fuel costs for the approximately 3000 mile long transcontinental route is 6.1% of total costs while for the Sydney-Halifax route (294 miles), fuel cost amounts to 2.7% of total costs.

A comparison of revenues received versus costs incurred for each service iss not very encouraging. Even in the case of the Windsor-Quebec City corridor services, the revenues received from passengers do not cover the train-related (direct) costs. A comparison of information contained in Tables II.5 and II.15 suggests that revenues covered only 38% of total costs (in 1977) for the corridor rail services while the train related (direct) costs amount to 42.5% of total costs.

Of all the links examined, Toronto-Montreal is the only service which earns revenues in excess of the train-related (direct) costs. An examination of Tables II.9 and II.15 suggests that in 1978 revenues comprised 48.3% of total costs while train related expenses comprised 48.2% of total costs. For the other three links studied, namely Ottawa-Montreal, Montreal/Toronto-Vancouver, and Sydney-Halifax, passenger revenues are slightly higher than one-half the train related costs. (See Tables II.10, II.11, II.12, II.15 and II.16).

Another classification of railway costs is that of infrastructure versus non-infrastructure costs. A summary of such a cost classification scheme is presented in Table II.17 for selected services. Infrastructure costs form a smaller part of total costs (12.6% to 17.5% for the services examined). Non-infrastructure costs are highest for the transcontinental service (87.4% of total) and lowest for Sydney-Halifax service (82.5% of total). In the case of two corridor services examined, present non-infrastructure costs are 84.6% and 82.9% for Toronto-Montreal and Montreal-Ottawa respectively.

II.5 Modal Comparisons of Service, Costs and Financial Loss

In order to appreciate modal costs and subsidies, it is beneficial to examine transportation supply and travel characteristics. For six major travel links in the Windsor-Quebec City corridor, modal travel volumes, travel time, user cost and frequency data are presented in Table II.18. Automobile, on a door-to-door basis is the fastest mode for distances less than 100 miles. Air mode is of course the fastest beyond 100 mile travel distances. Bus is the least expensive mode. Among the public modes, rail has the lowest load factor except on the Toronto-Montreal route.

Modal costs and subsidy characteristics of travel modes serving the six corridor routes are given in Table II.19. Bus is not a subsidized mode. Automobile incurs less than 1¢ per passenger mile of subsidy. Subsidies for the air mode (in ¢/passenger-mile) are shown to occur only on three links. These are: Toronto-London 4.7¢, Ottawa-Montreal 2.6¢, and Montreal-Quebec 2.1¢. For longer distances involved in the case of the remaining three corridor links, there are no subsidy requirements (Table II.19).

Rail travel incurs the highest deficits among all modes. Losses involved range from 1.25 times revenues for Toronto-Montreal service to over 4 times the revenues for Ottawa-Montreal. It should be noted that the Toronto-Montreal rail service, which in comparison with other services, is the least subsidized route, has the highest ridership and the best level of service. In the Ottawa-Montreal route, of all public modes, passenger train service has the worst level of service. Passenger train service in the Ottawa-Montreal route also incurs highest losses.

CHAPTER III

RAIL PASSENGER POLICY AND VIA's PRESENT MANDATE

III.1 Rail Passenger Policy

The National Transportation Act of 1967 declared as one of its principles that carriers should be compensated for transportation services, facilities and resources used in the provision of transportation as an "imposed duty". (27) In accordance with this national transportation policy principle, the provisions of sections 260 and 261 of the Railway Act were established. (28) These sections of the Railway Act enabled the railways to receive a maximum subsidy of 80% of losses associated with passenger services supplied in the public interest.* Commuter services were exempt from the subsidy. This subsidy formula was designed to apply in the course of a service and system rationalization that was expected to take five years.

In compliance with the terms of the legislation, upon the railways' request, the CTC declared all existing intercity passenger train services to be uneconomic, and thus eligible for subsidy. According to the subsidized service arrangement, a minimum level of service was established. At the discretion of the railways, additional service or frequency could be provided since subsidies were paid on the CTC required service as well as the improved service.

As the subsidy did not cover 100% of the loss and there were no financial incentives available, it was certainly not in the interest of the railways to invest in the passenger system. Funds charged to depreciation and cost of capital were directed to general corporate needs.

In the early seventies, it was realized that subsidy requirements for passenger railway were increasing at an alarming rate due to declining passenger revenues and escalating costs. The revenue/cost ratios had declined in all segments of the passenger train market. (See Tables II.3 and II.4). The merit of continued train service at some locations was questionable and it became clear that parallel bus services could adequately serve the small number of rail users. In 1974, $167 million was paid as passenger railway service deficit. This deficit was projected to grow beyond acceptable levels in the future (i.e. $400 million for 1980). Revenues covered about one-third of the total costs. Annually only one-third of the seats offered were sold. The CN and the CP duplicated services on more than 2000 miles of train routes.

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* It was maintained by the CTC that subsidy payments should cover a share of the costs of the roadbed, depreciation, cost of capital, and the direct costs of operating the railway passenger service.

The national policy then being pursued did not result in capital investments for the economic improvement of the system. A policy review initiated by the Minister of Transport identified the need for service rationalization, integration and modernization. (29) It also became clear that in the case of passenger railway, a passive role of the Government and reliance on "market forces" for guiding transport system developments compatible with societal goals was not appropriate. A new dynamic role of the Government for guiding future developments of the transport system was believed to be necessary. (30)

A number of policy objectives and principles were adopted as a result of the transportation review. It was stated by the Government that "Canadians must have an efficient transportation system providing a high degree of accessibility and equity of treatment for all users. Transport must support national and regional, social and economic objectives". (31) Policy objectives and principles placed a special emphasis on an efficient, integrated transportation system with the best level of service (at the lowest possible cost). (31)

As a result of the policy review, the Railway Passenger Policy was developed which was stated in the House of Commons on January 29, 1976. (32) This policy directed that railway passenger services be revitalized by developing a plan and program to control the escalation of the deficit, creating coordinated management, and rationalizing railway services by eliminating duplication of services from the basic network.

As a part of the policy, the government declared its intention to improve those services for which trains are well suited and well patronized, and to encourage their replacement by more suitable modes where trains are no longer well suited. Three major roles of passenger trains were identified: (32)

1. High speed services in areas of high population density over short to medium distances, where there is a large volume of travellers;

2. Basic surface transportation over long distances, where service levels somewhat above those on a bus are required; and

3. High capacity commuter services in large urban communities.

Rail services, it was stated, should also continue in those remote areas where no other services exist until more suitable modal means become available. (32)

Also, on January 29, 1976, the Minister of Transport issued a directive for the guidance of the CTC on railway passenger services (regulation, rationalization) which stressed the need for seeking the best method of satisfying passenger transportation requirements regardless of mode and stated a number of specific principles: (33)

1. Substantial reduction in subsidy and greater degree of economic self-sufficiency in service operation;

2. Elimination of unnecessary duplication of services in the establishment of a main rail network with connecting rail or other modal services;

3. Common use of facilities belonging to CN and CP and, to the degree feasible, common service support;

4. Better matching of carrying capacity and equipment with traffic, and the consideration of less costly service or equipment alternatives for peak loads;

5. Improved (convenient) scheduling of services;

6. Fare policy aimed at improved commercial viability and reduction of subsidy levels; costs of improvements in quality and reliability of service to be reflected in pricing policy;

7. Users to be charged fully for those services and amenities that are over and above the basic coach class requirements; and

8. Continuation of rail passenger service in cases where no other commercial service exists.

As an essential and significant part of passenger policy, the Federal Government declared its intention of increasing its payment from 80% to 100% of the estimated net costs of passenger train services borne by the railways. Additionally, financial incentives were promised, as well as the intention of assuming other financial responsibilities such as capital for the acquisition of passenger equipment and up-grading or additions of the railway plant for passenger services.

III.2 Formation of VIA Rail Canada Inc.

Following the announcement of the Passenger Rail Policy and program, CNR and CPR began consultations to form a joint management organization for the provision and operation of passenger rail services. This effort failed since the two railways could not reach an agreement on a jointly held company.

In an attempt to establish an integrated railway passenger operation, VIA Rail Canada was incorporated in January, 1977 under the Canada Business Corporations Act as a non-comprised subsidiary of CNR, with a separate Board of Directors and separate financial reporting. CPR was also represented on the Board.

A second key step was taken so as to provide a legal base for VIA Rail. VIA was deemed a railway by Vote 52d Appropriation Act No. 1,

1977 which brought it under the jurisdiction of the Railway Act. This step gave VIA the powers of a railway and made it subject to regulation by the CTC. VIA was declared a Class I railway by the CTC in late 1977.

The Minister of Transport was given the authority by the legislation to contract with VIA for the provision and management of passenger rail services on a specified route basis. The legislation enabled VIA to contract with any railway (subject to Ministerial approval) to operate trains on specified routes in accordance with VIA's management direction. According to the legislation which launched VIA Rail, authority was given to contract at 100% of the net cost of operating passenger services plus incentives. This was a departure from the provision of Section 260 of the Railway Act which stipulates payments amounting to 80% of actual losses.

During 1977, it became apparent that the provisions necessary to protect the CPR and other provisions necessary to protect the Government, removed from CN all effective control and authority over its subsidiary. In the late 1977, it was decided, with the consent of the railways, that the Crown should purchase VIA. Authority to purchase VIA was granted to the Minister of Transport by Vote 156a of Appropriation Act No. 3, 1977/78 passed in December 1977. The purchase was completed on March 31, 1978 and VIA became a proprietary Crown Corporation under Schedule "D" of the Financial Administration Act (PC No. 1978/954 Canada Gazette SOR/78-287) on April 1, 1978. (35)

In the process of forming VIA Rail through the Appropriation Act No. 1, it is significant to note that measures were not taken to modify the Railway Act (Sections 260, 261, 262) to relieve the railways of their statutory responsibilities for providing passenger rail services. In fact, measures have been taken by the CTC under Order R26520, to outline clearly the continuing responsibilities of CPR and CNR rail services under VIA's management and in the event VIA is unable to provide passenger services.

III.3 VIA's Present Mandate

Via Rail Canada inc. was formed as a part of an organized effort to revitalize the passenger railway sector of Canadian transportation and at the same time reduce the financial losses borne by the Federal Government. VIA's formation was believed to be a potentially more effective alternative to the then existing management of rail passenger services by CNR and CPR.

VIA's mandate, in simple terms, is to provide, manage, and operate railway passenger services in Canada within the policy and fiscal limits set by the government. As a Crown Corporation, VIA is authorized to enter into contracts with the Federal Government for the management of passenger rail services including marketing, the performance of on-board services, reservations, ticketing and station duties. In order to fulfill these duties, VIA in turn is permitted to

contract with the railways to operate trains.

VIA can exercise the powers of a railway company. Its actions are guided by Government policy and the regulatory authority of the Canadian Transport Commission. VIA has the authority to purchase assets and control its own employees. VIA owns its railway rolling stock. It is authorized to own other assets as well.

Beyond these obvious statements about VIA's present mandate, much confusion appears to surround VIA's role. One contributing factor toward confusion is that VIA's role has been described differently in a variety of documents. It appears that VIA does not have a legislated mandate that defines its role and objectives and what is delegated to it through the negotiated process.

There are problems associated with VIA's present mandate and its exercise in the provision of passenger train services. These problems are described in Chapter IV of this paper.

CHAPTER IV

THE FRAMEWORK FOR THE PROVISION OF PASSENGER TRAIN SERVICES

IV.1 The Contracting Mechanism

The concept of a contract to provide passenger train services and to control the expenditure of public funds for supporting uneconomic passenger services evolved over time. The Ministry of Transport's Policy Review of 1975 clearly stated the government's intention to improve railway patronage and to reduce financial deficits. A major factor contributing to the lack of investment and management innovations, and the consequent deterioration of the system was the level of compensation (80% of actual losses) received by the railways.

The 1976 Passenger Rail Policy corrected the situation by increasing payments to cover 100% of losses,* offering incentives to ensure the efficiency of management and making it possible to create direct financial programs for system improvements. In order to put these concepts into practice with the objective of controlling government's financial support for passenger train services and to improve performance, a program of contracts was developed.

VIA Rail's mandate is effected through contractual agreements between the Federal Government and VIA on one hand and between VIA and the railways (Canadian National and Canadian Pacific) on the other. Through a contract, the Federal Government instructs VIA to provide rail passenger services according to the specifications of the Minister of Transport and the Canadian Transport Commission (CTC). The Minister of Transport is therefore in a position to specify the level of financial support.

The Railway Passenger Services Contract is the overall contract which outlines the terms and conditions of VIA Rail Canada's obligations to the Minister of Transport. VIA is required to provide, under Article 2 of the Contract, the services identified by the Minister in a Subsidiary Service Request (SSR). These SSR's are the major instrument of government's financial management and control over VIA.

VIA, in turn, enters into contracts with the railways for the operation and maintenance of passenger trains and support facilities, and the use of other railway-owned equipment and facilities.

In order to initiate the contractual process, Transport Canada provides to VIA a "written notice" requesting VIA to submit plans and financial projections (i.e. projections of costs and revenues for different levels of service) for specific services. This "written notice" comprises an outline of government objectives for the service

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* i.e. full compensation at the long run variable cost level.

(including intermodal considerations), a reiteration of the minimum level of service specified by the CTC, a base level of expenditure for planning purposes, and possibly a list of special items for consideration by the Corporation.

VIA, in turn, is required to submit, within twelve weeks, a detailed plan and financial projection for the required service in the planning year in addition to data on historical trends. Additionally, major initiatives proposed by VIA in support of government objectives are outlined on a multi-year basis.

An evaluation of these plans and financial projections, submitted by VIA, is then carried out by Transport Canada with a view to determining an optimal service package at an acceptable price. The SSR contract price is calculated as the difference between total expected costs (as measured by using CTC order R6313 as a base), minus the total expected revenues (estimated from VIA plans and financial projections as a base). The service package thus devised is aimed at the maximum satisfaction of service and other objectives at the least cost to the government.

A major step in the contractual process is negotiation between VIA and the government to design a package acceptable to both parties. Once the two partaies reach an agreement, the Minister of Transport issues a Subsidiary Service Request outlining the service to be provided, the total cost to the government, and any other matters relevant to the service (e.g. performance guidelines, and other targets accepted by the parties as assessment tools).

The merit of the contractual process is that it commits VIA to an agreed level of performance at an agreed cost. This process provides a strong incentive for VIA to lower its costs and increase its revenues. Should VIA meet its service commitments at a lower cost than the contracted amount, or increase its revenues, it would enhance its financial position.

In addition to the controls built into the Railway Passenger Service Contract, VIA as a Crown Corporation is also subject to all the financial and reporting controls under the Financial Administration Act (FAA) as well as those of the Canadian Business Corporation Act (CBCA).

IV.2 Management Problems

IV.2.1 The Roles of Major Actors: VIA, The Minister of Transport and the CTC

The interrelationship between VIA and the Government as described above, is effected through the Passenger Service Contract. An impression was conveyed above that the Minister has the authority to control the levels and quality of service, the fare structure and the total payments. The CTC under the Railway Act also has the power and

responsibility to define and enforce a minimum quality and level of service. Therefore, it appears that the Minister of Transport and the CTC have overlapping roles. Another implication of this jurisdictional overlap is that discontinuance of uneconomic and ineffective services is a time consuming activity.

It should be noted that the formation of VIA and the development of the contracting process has not affected CTC's function under current legislation (i.e. approval of joint railway freight/passenger construction, safety standards and equipment, accounting systems and reports, and the definition of railway costing systems).

IV.2.2 Limitations in VIA's Mandate

VIA's mandate in its present form has many features which limit its actions and potential. These are:

1. VIA does not have financial continuity such as the multi-year commitments recently granted to AMTRAK (U.S.A.), (36);

2. VIA has no power to create subsidiaries;

3. VIA has limited latitude to manage the level of service within the framework of the market place since the contracting process controls only increases in frequency above the present CTC defined levels;

4. VIA has a constrained action space for planning the passenger railway system since all planning decisions of VIA are potentially subject to detailed CTC sanctions. These constraints in the present system limit VIA's capability to experiment or to eliminate in an expedient manner those services with little socio-economic merit or potential;

5. There are insufficient economic and social criteria stated in VIA's mandate that can serve as rationale for service improvement or service discontinuance;

6. VIA has limited opportunity to control costs since about two-thirds of passenger train expenses are beyond VIA's control. Moreover, there is little opportunity to check the appropriateness of charges submitted by the railways due to the confidentiality clauses in the Railway Act;

7. Although VIA has the powers of a railway, it does not as yet own rolling stock maintenance facilities, stations, and track with potential for dedicated passenger train use. AMTRAK is fortunate in these respects (36,37);

8. VIA does not have (direct) authority to conclude Railway Passenger Services Contracts with provinces or other interested parties, even if these services can be agreed upon on a fully allocated cost basis. AMTRAK has current service agreements with six states; eight other states have indicated an interest in initiating service agreements. (36)

IV.2.3 Problems with Railways

1. Acquisition of Station -- VIA is at present having a dispute with CP over acquisition of Regina's Union Station and is seeking an order from the CTC for such a transfer.* It has been reported that VIA is proceeding with "active planning" for intermodal transport terminals (for both trains and buses) in five other cities including Vancouver and Quebec City and is considering prospects in seven others including Toronto. (38,39) If VIA is successful, it will be permitted to pay net book value (as a transportation terminal) rather than the estimated commercial value.

2. Cost Information -- As stated previously, according to VIA, it has little control over nearly "two-thirds" of its costs since CN and CP have refused to provide unit cost information to VIA. Transport Canada cannot release such information under the Railway Act. The CTC does have authority to release the information to VIA under the Railway Act, if it is judged to be in the "public interest".

   For effective planning and cost control, VIA has to estimate costs for future conditions. The use of R6313 costing order is largely irrelevant in this respect. Cost information for planning can be realistic if it is obtained from an assessment of changes in cost of labour, materials, and related items as well as the requirements for these resources for planning and operating strategies. VIA is unable to obtain such information from the railways.

3. Costing Practice -- Cost estimates for passenger train operations are established on the basis of CTC costing order R6313. These estimates apply to services approved by the CTC. Should VIA desire a higher frequency of service for marketing or experimental purposes than currently ordered by the Government and/or the CTC, it must be negotiated with the railways. The implication is that the railways could charge for such new services a more costly commercial rate rather than one on the basis of R6313.

* Since the writing of this report VIA and CP Rail have reached a tentative agreement on the sale of Union Station in Regina for approximately $3 million.

CHAPTER V

VIA's POTENTIAL IN FULFILLING RAIL PASSENGER POLICY OBJECTIVES

V.1 Introduction

VIA Rail Canada is expected to revitalize the passenger railway industry through improved, convenient and attractive services at minimum cost to the government. The Minister of Transport and the Canadian Transport Commission have directed VIA to operate a rationalized network of passenger train services in accordance with the passenger rail policy. While economic and social criteria for service continuation and modernization are not specified in detail by the passenger rail policy, the achievement of reasonable levels of economic efficiency and cost-effectiveness with respect to social and other criteria are implicit in VIA's mandate.

In this Chapter, VIA's potential in fulfilling rail policy objectives is explored. This assessment is based on answers to the following interrelated questions within the context of various system and service options examined:

1. Are conditions in which VIA operates favourable to effective management of passenger railway transportation?

2. Can passenger trains run by VIA under the existing supply environment satisfy the role prescribed by the government in rail policy?

3. Can VIA under the existing supply arrangement take full advantage of the desirable technological and operating characteristics of passenger trains?

4. Can VIA be cost-efficient (i.e. substantial reduction of deficit per passenger mile) and cost-effective (i.e. the achievement of intended criteria at minimum cost or within financial limits)?

V.2 The Status Quo Option

V.2.1 The Management Environment

A comparative study of the passenger railway transportation supply environment in a number of industrially advanced countries suggests the following conditions favourable to effective management of rail passenger services (See references 37, 40-44).

1. Reasonable autonomy in establishing fare policies, availability of resources and technical capability to undertake marketing and promotional efforts;

2. Local industrial base and R&D facilities capable of providing suitable equipment;

3. Ownership/complete control of rolling stock;

4. Ownership/complete control of track (so as to have flexibility of scheduling, priority of right-of-way, ease of implementing improvement plans);

5. Ownership/exclusive or almost exclusive use of tracks in important travel corridors for the purpose of eliminating capacity constraints and track damage caused by heavy freight trains;

6. Ownership/complete control of rolling stock maintenance facilities for cost and quality control;

7. Ownership/complete control of stations (for cost control and opportunities for creating intermodal operations);

8. Financial continuity for effective planning and decision-making;

9. Latitude in planning service changes and demonstration.

In Table V.1, Canada is compared with a number of other industrially advanced countries in terms of the above listed factors. From the number of checks it is clear that VIA is operating under an environment which is not necessarily favourable to effective management of passenger railway. A number of unfavourable conditions are highlighted below.

Successful passenger railway service, among other factors, requires modern rolling stock and properly designed and well maintained track. VIA lacks both. Although VIA owns its rolling stock, most of it is more than 25 years old. Equipment shortage at peak times has been reported recently. Although 10 LRC train sets (22 locomotives, 50 coaches) to be delivered in the near future will be a valuable addition, VIA's needs for proper equipment are likely to become critical in the eighties. A recent article in Railway Age forecasts the demand for 200 rail cars from VIA Rail Canada (5 to 10 year outlook). (46) Such an estimate is likely to be conservative since most of VIA's (1000) passenger cars are over 25 years old and technologically inappropriate for a modern era of passenger trains.

Countries with successful passenger train services have strong R&D and manufacturing capabilities for train equipment to satisfy local requirements. The passenger train equipment manufacturing base in Canada is limited to the MLW-Bombardier of Montreal and Hawker Siddeley in Thunder Bay. The situation in the U.S.A. is not much better. MLW's product, the LRC train, although designed for existing tracks in terms of its pendular suspension (i.e. tilt body feature) for passenger comfort and higher speeds on curves, is controversial and expensive. The existing design of the locomotive (used for LRC trains) has heavy axle-weight and is expected to result in high track maintenance costs for operating speeds in excess of 90-95 mph (144-152 km/hr). Therefore, the LRC's cruising speed capability of 120 mph (192 km/hr) cannot be gainfully utilized.

The tilt body feature of the LRC coaches will have little merit in the case of new or improved tracks with geometrics designed for higher speeds than currently experienced in Canada. It appears that there is a market in North America for a technologically advanced diesel-electric train without the expensive and heavy pendular suspension feature and a properly designed locomotive with low weight/axle. Such a train would find much application in Canada and in the U.S.A. for high speeds (120 mph, 192 km/hr) on new or upgraded (improved) track without causing high track maintenance requirement. The High Speed Train (HST) of the U.K. is believed to be one such design.

In addition to the scarcity of modern train rolling stock equipment manufacturers in North America, there is also a limited projected supply of rail diesel cars (RDC's) for use in lightly travelled routes. Refurbishing plans for 96 self-propelled RDC's were announced by VIA in 1978. (18) However, numerous delays have hampered implementation of these plans.

VIA operates its trains over essentially freight-oriented roadways owned by CNR and CPR. Although CNR is publicly owned, for all practical purposes, its perspective is that of a "for-profit" operation. The CPR is a private corporation. The tracks owned by both railways are taxable roadways. VIA's use of tracks in a mixed (freight plus passenger) environment results in train interference and potential delays for both types of traffic.

It is well known that the common use of the same track by fast passenger trains and freight trains results in a variety of problems. The severity of problems is in proportion to the volume of traffic, the speed of passenger trains, and weight per axle of freight cars. The speed differential of passenger and freight trains takes a heavy toll on track capacity. The rate of fatigue of the track increases as the weight per axle and speed increase. Such problems could result in situations where it is no longer possible to maintain the quality of track necessary to ensure passenger comfort on fast trains. Also, in the future, high speed passenger trains hauled by locomotives with high unsprung axle weights (e.g. the present generation of LRC locomotive) will result in high maintenance costs.

Freight cars over the years have become bigger and heavier, thus causing extensive track damage. Recent studies show that a 90-Ton car stresses railhead steel beyond the elastic limit and results in plastic flow*. The end result is very rapid deterioration of the physical and geometric characteristics of the track which makes tracks unreliable, even dangerous for passenger trains. (45) Bigger, heavier and slower freight trains in the recent past resulted in the flattening of the geometric design of tracks, thus slowing down passenger trains as well.

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* Plastic flow implies fatigue and results in destruction of rail steel. The damage caused by very heavy rail cars to high quality steel railhead is 19 times as severe on level tangent as by average (60-Ton load) cars and 31 times as severe on curves. (Reference 45).

Passenger railway managers in a number of countries have come to realize that it is sound practice to separate, whenever possible and economically justified, freight and passenger traffic.

Maintenance of rolling stock, and planning and operation of passenger terminals (stations), are important aspects of passenger railway management. For cost and quality control in equipment maintenance, passenger railways of countries listed in Table V.1, with the exception of Via Rail Canada Inc., own their rolling stock maintenance facilities. In the case of passenger railway stations, in addition to reasons of cost control, ownership/complete control of stations by the passenger railway company offers opportunities for intermodal coordination.

Like any other business, passenger railways need financial resources on a regular basis for effective planning, programming and decision-making. On the basis of past financial performance, passenger railways in general are hardly in a position to raise equity financing for their operational and capital needs.* In the case of VIA, as is also true of other passenger railways, governments are the only recourse. AMTRAK of the U.S.A. was recently awarded a "two-year" authorization" for operating expenses and longer term commitments for capital expenditures.(36)

The importance of planning train service developments, and the definition and implementation of demonstration projects is evident from the success of intercity passenger train services of several industrialized countries listed in Table V.1. Although VIA Rail Canada does not have as much latitude in planning as other railways, primarily due to differences in the institutional structures of different countries, there are sufficient degrees of freedom to respond to the Federal Government's requests for developing passenger rail system options and their implications.

V.2.2. An Assessment of Service and Economic Factors

Presently, VIA provides four distinct types of services. These are corridor services (conventional coach service on short distance routes), transcontinental train service (complete with such amenities as sleeping, dining, and lounge facilities), regional/local services and finally remote area services. The existing system was rationalized as a result of CTC hearings between 1976 and 1978, in terms of discontinuance of a number of regional/local routes and the adoption of plans for transcontinental train services (Western Transcontinental Plan: October 1977; final Eastern Transcontinental Plan: January 1979).

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* The only intercity passenger train service in the industrialized countries that is profitable is the Shinkansen (Japan). There are also other short haul railways in Japan which are profitable as well. However, the passenger revenues of the Japanese National Railway as a whole do not cover costs incurred. (Reference 44).

As a result of these service alterations, the Federal Government's projected deficit for 1979 was reduced by about 11%.

While rail is best suited to the corridor type of services, and remote areas without adequate travel alternatives, there are serious inefficiencies associated with regional/local passenger train services. The transcontinental (long distance) service role of passenger trains in their present form is questionable. Although trains are well suited for commuter services, such a role is not pursued here since, for all practical purposes, VIA is not responsible for commuter trains in Canada. This, however, does not mean that VIA should not get involved in commuter train services.

From the viewpoint of efficient use of limited financial resources, the status quo option is very unattractive. Intercity passenger rail (on a passenger mile basis) has become the most heavily subsidized mode of travel. As compared to 15.6¢ per passenger mile of subsidy for passenger trains, the automobile subsidy is about 1¢ per passenger mile; the bus mode appears to be completely self-supporting without subsidy; the air mode (including the costs of airports) is in between the bus and rail modes. Although much controversy surrounds these figures, the relative financial performance of the various modes is generally accepted by most analysts. (2)

The merits of Federal expenditures should be examined for passenger railway transportation as well as other transportation modes. In 1979, the magnitude of financial loss for passenger train services, paid by the Federal Government, amounted to $232.421 million dollars. (6) Revenues amounted to 30.8% of total costs. In constant dollars, loss per passenger mile in 1979 was 12% higher than that incurred in 1972.

As noted earlier in this paper, corridor train services show (on the basis of 1977 data) the highest revenue/cost ratio (38% for corridor vs. 27.9% for transcontinental and 13.6% for regional and local services), and are responsible for only 26.6% of total losses compared to 54.1% for transcontinental and 14.9% for regional/local services. Trains in the Windsor-Quebec City corridor carry over 50% of all passengers. On the other hand, the transcontinental trains carry less than one-third of all (train) passengers. Corridor and transcontinen- tal trains on the average experience about the same loading levels. Regional/local trains show about one-half the corridor load factors.

In addition to covering VIA's financial losses, the Federal Government has committed capital for rolling stock (10 LRC train sets, refurbishing of rolling stock), a computerized reservation system and modest track improvements. Under the existing supply arrangement, VIA is ill-prepared to take advantage of the desirable technological and

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* 1979 subsidy paid by the federal government has also been stated to be about 270 million dollars.

operating characteristics of passenger trains for service improvements and cost reduction. Due to the absence of modern equipment and improved track for the next few years (except 10 LRC train sets and marginal track improvements), financial losses are expected to continue and are likely to grow at about the general rate of inflation.

It is likely, that the loss per passenger mile (in constant dollars) will decline slightly for some services as a result of cost control and better matching of equipment supply with service demand (e.g. RDC service in lightly travelled areas). These small scale cost reduction measures and isolated efficiency improvements, however, will not be significant enough to reduce the public subsidy in a meaningful manner. Over the next five years with annual operating payments averaging more than $250 millions, the 1980-85 subsidy requirements alone could be in excess of 1.2 billion dollars. Adding a modest capital requirement of say $100 million per year would increase the total 1980-85 expenditure to 1.75 billion dollars.

The Federal Government has not specified firm criteria which VIA should achieve in return for Federal financial support. In contrast, the U.S. Congress has defined service and economic criteria that are to be met by AMTRAK in return for substantial financial assistance. These are: the attainment of a 55 miles per hour average system-wide speed, 50% improvement in on-time performance, and by 1985 the attainment of revenues covering 50% of operating expenses (i.e. total expenses minus administrative expenses and cost of capital). It should be noted that AMTRAK's revenues to operating cost ratios in recent years were: 38.3% in 1978 and 41.5% in 1979. (36) Also, it is useful to note that AMTRAK's operating expenses amount to about 91-92% of total costs.

It can be argued that the merits of government subsidy of passenger trains relate to the unique benefits derived by train users and the communities served, as well as to savings in public expenditures for services of other modes substituted by rail. Detailed investigations of either existing or planned (future) systems have not been carried out in terms of estimating train user and community benefits and/or disbenefits from other modes for which rail passenger services may be regarded as substitutes.

A preliminary investigation of economic critera for the modernization of passenger railway services (in the Windsor-Quebec City corridor), which incorporated user related benefits for illustration purposes, was reported by the author. (49) Results show that the use of economic criteria, including user benefits, rather than strictly financial criteria for system evaluation shows trains in a favourable light.

To judge VIA's impact in an intermodal sense, it is necessary to estimate how its patrons would have travelled if rail services were not available. The alternative chosen by an individual traveller, of course may vary from city-pair to city-pair. For any given trip, the choice will depend on modal availability, relative transport costs and

other objective as well as subjective determinants of modal preference.

In the absence of Canadian survey data about modes that would be used by rail passengers in the absence of train service, multimodal travel simulation results are used. These suggest that in the Windsor-Quebec City corridor, out of all train passengers shifting to other modes, 57% go to the automobile, 32% to air and only 11% go to the bus mode. (50) Travel simulation data for non-corridor type of (Canadian) travel are not available. However, a recent AMTRAK survey suggests that in "non-corridor" type of travel, shifts of rail passengers to other modes would be 49% auto, 25% air and 26% bus.(51,52)

In the light of the above potential modal shifts in the absence of trains, what can be concluded about the merits of the expenditure of public funds for passenger trains?

Although energy use is only one of many dimensions upon which the desirability of continued federal financial support should be based, it certainly is a critical area of concern. The status quo option is helpful in energy conservation terms for corridor travel only. Studies carried out by the author for short haul (corridor) travel in Canada* and a number of investigations of AMTRAK's energy impacts** suggest that passenger trains are helpful in saving energy within corridors such as the Windsor-Quebec City corridor (Canada) and the North-East corridor (U.S.A.). On non-corridor travel routes, either due to very low load factors (e.g. regional/local cases) or excessive equipment hauled by trains (e.g. the transcontinental train consist), passenger railway appears to be an energy-loser. (50,51) These observations apply to future conditions as well. In a petroleum crisis, rail is more energy efficient than even the bus in the corridor travel context. In a crisis situation, it is understood that the sole concern is with petroleum use. (51)

Rail in its present or even much improved form has only a minor impact on the alleviation of congestion at busy airports such as Toronto's Malton Airport. (55) Similarly, highway congestion impacts are also minor. In terms of safety and environmental quality the impacts of passenger trains are favourable. (44)

In summary, under the existing system option (i.e. the status quo), VIA's corridor and remote services fulfill their intended modal roles. The regional and local services are expected to be lightly used. The transcontinental train services in their present form will experience better utilization between city pairs on long distance routes, although the cost of such services will continue to be high. Marketing and efficiency efforts by VIA will not change the overall magnitude of passenger train expenditures. The benefits of maintaining

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* See references 50,53,54.

** See references 51,52.

the passenger railway system in its existing form are: communities served, railway jobs maintained, and in the corridor context, energy conservation, safety and environmental quality enhancement. For non-corridor travel, it is likely that the energy objective is not achieved through poorly used and technologically inappropriate trains.

V.3 The Option of Major Service Abandonments

Without regard to the social and economic contribution of long distance and regional/local (i.e. non-corridor trains), an option for the immediate reduction of financial loss and possibly for energy conservation is their abandonment. Carried to its extreme, the least patronized and highest cost mode could be dissolved altogether. This of course implies winding up VIA. Road and air modes would fill the travel gap. Estimates of travel shifts to other modes in the absence of rail have already been discussed in Section V.2.2. of this paper.

The view taken under this option is that of economic efficiency. It means that resources are limited. The transport services that are not supported by travellers to a sufficient degree should be eliminated. This is fundamental to concept of economic efficiency. (52)

The extreme case implies, of course, that at least all passenger railway related jobs will be lost. There are about 4000 of these employees on VIA's payroll alone. (18) As intercity passenger trains are twice as labour intensive as other modes, there would be a net loss of employment in Canada due to the complete abandonment of passenger trains.* The reaction of interest groups would be severe. Also, the (fixed cost) contribution of passenger trains toward freight service would be lost.

In the absence of a detailed study of the costs and (social and economic) benefits of complete dissolution or even a drastic reduction of services (i.e. the transcontinental and regional/local train services), this option of major service abandonments is not pursued here.

V.4 The Incremental System Modernization Option

The objective is to achieve on one hand short term expenditure reduction and on the other hand improvement of services for enhanced user patronage, as well as long term improvements in economic

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* Intercity	L.F.	Jobs/Million Passenger Mile
Car	2.9 people	3.7
Plane	53% full	3.8
Bus	47% full	3.1
Train	37% full	7.2

Source: Reference 56 (Table 2).

performance. This requires careful restructuring of services and selected capital investments in long run improvements. Comprehensive planning is necessary to identify those routes where trains can attract a substantial ridership without excessive subsidy requirements.

Options for route structuring require definition and testing for financial and other implications. As part of planning, passenger train deletions or improvements would be investigated carefully in terms of modernization potential including capital expenditure. The end result would be a preferred strategy for modernization of passenger railway transportation which is likely to provide positive net societal benefits.

The Detroit-Windsor-Quebec City corridor is a possible location for improvement. There are also other less densely populated corridors which might be able to support carefully planned rail services without excessive losses. Examples include Edmonton-Calgary and Halifax-Truro-North Sydney-Moncton-St.John.

The current practice of providing a national transcontinental train service needs careful assessment. Although only a small number of passengers travel the whole distance, these services are responsible for over 50% of the passenger railway loss. At the same time, meaningful train service is not provided between important city pairs that lie on the long distance route.

The implication of route restructuring and the orientation of passenger trains towards corridor type of service will be that some small towns (with adequate alternative transport service) will lose all passenger train services. Most places served by VIA are accessible by the highway network and many receive bus service. A large number of these locations are also served by air service.

V.4.1 System Development Concept

Passenger train ridership has been increasing steadily since 1975. Among other contributing factors, the increasing energy prices, increasing air fares, advertising and marketing are believed to be responsible. It is expected that these factors will continue to play a role in enhancing rail ridership. Despite ridership increases on the overall network basis for a number of years, it is doubtful whether substantial patronage and economic gains can be realized in the transcontinental and regional/local service sectors. Additionally, the freight oriented tracks in these service sectors offer little opportunity to upgrade tracks for passenger trains. Nevertheless, passenger railway transportation in well defined corridors (e.g. Windsor-Quebec City Corridor) requires careful assessment for substantial upgrading.

A number of investigations, in the past, have focussed on the modernization of corridor passenger train service. However, the only committed improvement that was announced (in January 1977) was a

demonstration plan for the Montreal-Quebec City link at a cost of $31 millions (for 90 miles/hour top speed, 2 hours and 30 minutes block time). Subsequent to the announcement, only $10.15 millions was allocated for the Montreal-Quebec demonstration. A successful demonstration on the Montreal-Quebec route, however, would cost more than the committed amount and the substantially reduced funds cannot be gainfully invested on this route.

There is a need to develop a framework for rail system development which encompasses both long-range objectives and short range improvements. In practical terms, this means that within the Windsor-Quebec City corridor and other corridors, a long range outlook would establish the ultimate potential for the provision of high performance passenger trains. Within such a development framework, programs for incremental system modernizataion can be identified.

VIA Rail Canada maintains that, in the development of passenger railway modernization plan, the following factors should be taken into account:

1. Trains should operate faster than presently permitted by railways in Canada so as to make passenger trains competitive with the automobile on a door-to-door travel time basis;

2. Where possible, passenger trains should be given exclusive use of tracks;

3. Important centres of population in the Corridor should be served by a single spine route (e.g. Montreal-Ottawa-Kingston-Toronto);

4. Corridors other than the Windsor-Quebec City corridor should be assessed for their potential in supporting passenger train service (e.g. Edmonton-Calgary);

5. For "non-corridor" travel, in association with other modes, the most suitable integrated transportation network plan should be developed which provides the needed transportation at minimum total cost.

The development of a passenger railway modernization plan, which takes into account the above factors, would involve:

1. Negotiation with railways for exclusive routes;

2. Negotiation with the CTC for (regulatory) permit and with Transport Canada for funding;

3. Reconstruction of track (at an estimated cost of $1 million per mile) for higher speeds, which involves:
   (a) improving existing track structure and geometrics;
   (b) building separate tracks as needed;
   (c) installing signal systems;

(d) grade separation or grade crossing protection for speeds in excess of 90 miles per hour;

4. Establishing actionable programs and projects for the incremental implementation of the passenger railway modernization plan (e.g. curve rectification projects and needed segments of new lines within an existing route).

V.4.2 Patronage and Economic Factors

A recent study of passenger train services in six advanced industrial countries found that conditions in which train ridership in a corridor can be expected to be high include: (57) high population densities, high per capita incomes, a large proportion of households with high incomes, low automobile ownership, 90 to 100 miles per hour average rail speeds, no bus services, high fares by air and low fares by rail. If none of the above factors apply, then train travel is not likely to be in much demand. Table V.2 indicates that on a comparative basis, not even the Toronto-Montreal corridor in Canada has at present all or even most of these favourable factors. See Appendix A for comparative data on transportation characteristics of selected corridors in six countries. Source of these tables is reference 57.

Low train fares improve ridership but decrease gross revenues. The importance of population densities as a contributing factor for increased train ridership is a very well known fact. However, it should be noted that density above some minimum level (not met by existing Toronto-Montreal corridor density) seems to be a necessary but not sufficient condition for commercial viability.

The importance of corridor population on passenger rail viability was investigated as a part of travel simulations for the Windsor-Quebec City corridor and the North-East Corridor (U.S.A.). See Tables V.3 and V.4. As shown in Table V.3, the change in rail ridership in the Windsor-Quebec City corridor from 1986 base case to 1991 base case is due to change in population and income level. The modal split however remains almost unaltered due to the absence of congestion in the transportation network. Improved frequency of rail causes some shifts from the car. For the North-East corridor case, shown in Table V.4, congestion effects cause the modal split to be altered.

In the North-East corridor travel simulation runs, the base case uses 1982 projected conditions in that corridor. (Table V.4). The higher density run examines the effects of having a tripled population density within the North-East corridor with accompanying congestion problems for the road system. This level of population density approximates that of the Tokyo-Osaka (Japan) and the London-Manchester (U.K.) corridors. The low population density run on the other hand equates the North-East corridor population density to that of the Montreal-Toronto corridor. (57)

Results shown in Table V.4 suggest that for high population test case, the total travel went up by a factor of 3 and the rail patronage increased by a factor of 4. Due to such high demand levels, the rail system operates with high load factors and associated desirable financial (revenues, costs) circumstances. Interestingly, a profit is predicted for the rail service under the high population density scenario. (57)

The low population density case simulates the existing Toronto-Montreal population density level. The results appear more unfavourable than expected. As compared to the base case, demand for rail travel drops by 63%, and operating losses increase by 157%. The direct operating cost per passenger mile increases by 70%. According to the findings of the North-East corridor study, it appears that a passenger train service in a sparsely populated corridor has few alternatives other than not to operate or to absorb significant losses. (57)

Table V.3 and V.4 in addition to showing the implications of population density changes, also show results of increasing average speed of passenger trains. In the Windsor-Quebec City corridor, increasing average speed of trains up to 100 miles per hour (160 Km/hr) results in 67% increase in rail patronage. Out of new traffic going to rail, 58% is shifted from other modes and 42% is induced traffic. Bulk of shifted traffic (66%) comes from the automobile, the rest is drawn from Air (23%) and bus (11%). In the case of North-East corridor, increasing average speed from 70 to 97 miles per hour (112 to 155 Km/hr) results in 30% increase in patronage. The induced traffic is 58% while traffic shifted from other modes is 42%. Out of these travellers who shift modes, 72% come from the car, 19% from air and 9% from the bus. Please note that a higher percentage of induced rail traffic for the North-East corridor, in comparison with the Windsor-Quebec City corridor, is possibly due to congested highways and higher air fares.

A number of travel demand simulation test runs were made for the Toronto-Montreal corridor in terms of estimating the effects of changes in passenger train speed, fare and frequency. Results show that 50% increase in speed (from base level) for constant fare and frequency levels results in 35% increase in demand. Similarly 50% increase in train fare at constant frequency and base level speed causes a 23% decrease in train ridership. Frequency of service, it appears, also affects travel demand. According to modal test results, 50% increase in frequency at constant fare and base speed level causes 20% increase in demand. In all three simulation cases, train consist is adjusted so as to maintain desired loading levels. It is essential that for rail service planning endeavours, information of the type discussed above should be utilized for the purpose of decreasing financial loss and enhancing the utilization of passenger trains.

As an illustration of rail systems analysis and research into travel behaviour, information contained in Figures V.1 and V.7 is presented. The impact of frequency of service and fare levels on

demand and revenues is shown in Figure V.1 to V.3. The importance of increasing service frequency (i.e. departures/day/direction) at the lower end of the scale is clearly displayed in Figure V.1 which suggests a diminishing marginal effect of frequency changes on demand. For a smaller range of frequency changes, demand increases are illustrated in Figure V.2 for given fare levels.

For given fare levels, the effect of frequency changes on rail's revenue is illustrated in Figure V.3. The implication of these results is that although ridership drops in response to fare changes, the inelastic demand for corridor rail travel results in increased revenues.* Increasing frequency of course increases ridership and consequently revenues increase.

These observations are further clarified by testing the effects on travel demand of simultaneous and equal changes in fare and frequency. See Figures V.4 and V.5. While ridership drops, revenues increase as a result of increasing simultaneously rail's fare and frequency.

For an actual or planned rail service speed level, and over a wider range of frequency and fare changes, it is possible to identify the optimal combination of fare and frequency which results in maximum reduction in financial loss. (58) As illustrated in Figure V.6, for the Toronto-Ottawa-Montreal corridor in the 1990's (100 miles per hour average speed service), the maximum reduction in financial loss occurs at the frequency of 12 departures per day per direction and at 13¢/passenger-mile (1977 constant dollar) fare level. (58) While these results are not intended to be definitive, the implication of searching the best combination of service parameters for the minimization of financial loss is however quite clear.

A study of the effects of corridor population level and track investment cost on reduction of passenger train financial loss is also quite relevant as well as interesting. As shown in Figure V.7, for any given level of track investment and upgrading, increasing population results in decreasing financial loss. Furthermore, the optimal level of track investment cost (for maximum reduction of financial loss) increases with increasing population level. For example, at base population level, which implies a certain travel demand level, $100 million (in 1975 constant $) has the highest effect on financial loss reduction. However, increasing population, which in turn implies increased rail travel demand, results in higher track investment costs to be most effective for reducing financial loss. (58)

A number of important observations can be made from the information presented in Tables V.2 and V.4 and in Figures V.1 and V.7. These are:

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* Revenues increase for the inelastic portion of the demand curve. Price increases beyond the optimal fare level will be in the elastic portion of the demand curve which will result in a drop in revenues.

1. For the foreseeable future, it is highly unlikely that passenger trains in Canada will be financially self-supporting. Under the projected socio-economic conditions in the Windsor-Quebec City corridor, passenger trains will continue to incur financial losses.

2. Increasing socio-economic parameters (i.e. population, income), increasing energy prices, improved marketing and advertising, and increased service frequency is likely to increase passenger train ridership. While financial loss per passenger-mile might decline slightly, the financial loss in total will not be reduced unless the optimal service supply parameters (i.e. average speed, frequency and schedules, fare) are carefully researched and applied.

3. From the information reported in this paper, the answer to the degree of track upgrading in the corridor, when viewed from a strictly financial (i.e. revenues vs. costs) viewpoint, is not conclusive. While increasing speed will increase train ridership and reduce the (equipment) rolling stock requirements, the financial merit (in cost-revenue terms) is not clear. Increasing speed implies increased energy consumption but increased user benefits (59) (e.g. travel time savings). Thus economic criteria, which are broader than the cost-revenue relationships, could potentially identify higher average speeds as being optimal.

V.4.3. Institutional and Management Implications

In order to plan, implement, operate and maintain a modern passenger railway system, an effective management structure and environment is required. VIA in its present form, as is clear from previous arguments, will not be effective for such an ambitious assignment. Therefore, one option worthy of consideration would involve definition of institutional, jurisdictional, and legislative changes that would grant to VIA, (among other powers and responsibilities), control over rolling stock maintenance facilities, ownership of stations, and complete control or ownership of those tracks with potential for exclusive or almost exclusive passenger train use.

The powers and responsibilities described above that VIA needs for effective management of passenger train services, are of course the same as were enjoyed by CNR and CPR over their respective passenger operations prior to VIA's formation. Thus far, full compensation for financial loss, capital assistance, and several other concessions (e.g. incentive payments) have been granted to VIA Rail Canada and this is reflected in its performance to date.

REFERENCES

1. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Transport and Communications, Issue No. 9, Thursday, Nov. 22, 1979

2. Canadian Transport Commission, "Eastern Transcontinental Passenger-Train Hearings, Summary of Evidence", Railway Transport Committee, Ottawa, January, 1978.

3. Canadian Transport Commission, "Transcontinental Passenger Train Hearings, Summary of Findings", Railway Transport Committee, Ottawa, September, 1976.

4. Canadian Transport Commission, "Transport Review, Trends and Selected Issues", Research Branch, Ottawa/Hull, March 1979. Page 78.

5. Canadian Transport Commission, "Maritime Rail Passenger Services, Passenger Survey", Research Branch, Report No. WP 40-77-25, Ottawa, October 1977.

6. VIA Rail Canada, "Annual Report 1979".

7. Canadian Transport Commission, Consumers' Association of Canada Brief.

8. Howe, J.D. and D. Richards, "Intercity Railway Passenger Transportation in Central Canada over the Next Ten Years: A Public Interest Approach to Development", Prepared for Transport 2000, Canada, Ottawa, 1977.

9. The Citizen, "Transcontinental rails doomed?", Ottawa, August 8, 1980.

10. The Citizen, "Don't cut trains, consumers plead", Ottawa, August 6, 1980.

11. Benjamin, L. (MP), "NDP Uncovers Confidential Plan to Cutback Trains", House of Commons, Ottawa, July 30, 1980.

12. Science Council of Canada, "Opportunities in Canadian Transportation: Rail and Bus As Modes/Industry Subconference", Montreal, 1979.

13. Office of The Premier, Ontario, "Province Establishes Task Force On Rail Policy", January 29, 1980.

14. Canadian Transport Commission, Railway Transport Committee Order No. R-29856, November 8, 1979.

15. Davis, W.G. (Premier of Ontario), "Immediate Actions for Job Creation", Federal-Provincial Conference of First Ministers, Ottawa, February 13-15, 1978.

16. Statistics Canada Catalogue No. 52-207.

17. Canadian Transport Commission, "Transport Review, Trends and Selected Issues", Research Branch, Ottawa/Hull, March 1979.

18. VIA Rail Canada, "Annual Report 1977".

19. VIA Rail Canada, "Annual Report 1978".

20. Canadian Transport Commission, "Transport Review, Trends and Selected Issues", Research Branch, Ottawa/Hull, 1977.

21. Transport Canada, "A Report On Canadian Passenger Rail Services", Information Canada, Ottawa, 1976.

22. Canadian Transport Commission, "A Comparative Analysis of Strategies for Inter-City Passenger Transport in Canada", Research Branch, Ottawa, 1976.

23. Transport Canada Internal Working Paper.

24. Canadian Transport Commission, "Economic and Financial Analysis of the Corridor Rail Passengers System", Research Branch, Report No. 40-79-03, Ottawa/Hull, 1979.

25. Canadian Transport Commission, "Corridor Rail Passenger Services: Review of Fares and Revenues", Research Branch Report 40-79-04, Ottawa/Hull, 1979.

26. Bureau of Management Consulting, "Energy Conservation in Intercity Passenger Transportation, The Windsor-Quebec Corridor", Volume 2, Report Prepared for the Renewable Energy Branch of the Dept. of EMR and for Strategic Planning Group, Transport Canada, Ottawa, February, 1980. (Financial data was obtained from Rail Economic Analysis Branch, Canadian Transport Commission).

27. Government of Canada, "An Act to Define and Implement A National Transportation Policy for Canada", Chapter N-7, Ottawa, 1970.

28. Government of Canada, Railway Act (RSC 1970 C.R-2) As Amended.

29. Transport Canada, "Transportation Policy: A Framework for Transportation in Canada - Summary Report", Ottawa, 1975.

30. Khan, Ata M., "Recent Transport Policy Initiatives in Canada: A New Role for The Government", Journal of Advanced Transportation, V. 13, No. 1, 1979, pp. 19-38.

31. Mulder, Nick, "Transportation Policy Goals and Efficiency: A Federal Perspective", Canadian Transportation Research Forum Annual Meeting, Winnipeg, June 1978.

32. Transport Canada, "Statement by Transport Minister Otto Lang on Rail Passenger Services," January 29, 1976.

33. Transport Canada, "Directive for The Guidance of The Canadian Transport Commission on Rail Passenger Services", January 26, 1976.

34. Appropriation Act No. 1 (1977) & Appropriate Act No. 3 (1977/78).

35. Canada Gazette, SOR /78-287, April 1978.

36. Amtrak, "Annual Report 1979", National Railroad Passenger Corporation, Washington, D.C.

37. Amtrak, "Background on Amtrak", National Railroad Passenger Corporation, Washington, D.C. Oct. 1975.

38. The Financial Post, "VIA Rail Terminal Bid Gets Into A Siding", August 16, 1980.

39. Benjamin, L. (MP) and S. deJong (MP), "Regina Union Station Backgrounder", Submitted to Chairman, Railway Committee, Canadian Transport Commission, Ottawa, June 23, 1980.

40. Amtrak, "The Modern Era: Canada", Public Affairs Dept., 1978.

41. Amtrak, "The British Railroad Experience 1947-1977, A Comparative Study", Public Affairs Dept., 1978.

42. Amtrak, "The Modern Era of The French Railroads 1937-1977, A Comparative Review", Public Affairs Dept., 1978.

43. Amtrak, "The Italian State Railways, A Comparative Study", Public Affairs Dept., 1978.

44. Amtrak, "The Railroads of Japan in The Modern Era, A Comparative Study, Public Affairs Dept., 1978.

45. Boyd, Alan S., President, National Railroad Passenger Corporation (AMTRAK), "Remarks At The Wharton Transportation Club, Philadelphia, PA.", Feb. 6, 1980.

46. Miller, L.S. (Editor), "Passenger Trains: Big Dollars Make A Big Difference", Railway Age, Jan. 14, 1980.

47. Federal Railroad Administration and National Railroad Passenger Corporation (AMTRAK), "Northeast Corridor Improvement Project Joint Annual Report Fiscal Year 1979", Feb. 5, 1980.

48. Amtrak, "Five Year Corporation Plan, Fiscal Years 1977-1981", National Railroad Passenger Corporation.

49. Khan, Ata M., "Economic Criteria for The Development of High Speed Ground Transportation Services in Canada", High Speed Ground Transportation Journal, V.8, No. 3, 1974.

50. Khan, Ata M. and A. Taylor, "Energy Conservation in the Windsor-Quebec City Corridor", (Forthcoming Paper).

51. Congressional Budget Office (U.S.A.), "The Current and Future Savings of Energy Attributable to AMTRAK", A Staff Draft Analysis, Natural Resources and Commerce Division, May 1979.

52. Mulvey, F.P., "AMTRAK: A Cost-Effectiveness Analysis", Transportation Research, V.13A, pp. 329-344, 1979.

53. Khan, Ata M., "Intercity Passenger Transportation: Energy Consumption Characteristics", Transportation Planning and Technology (forthcoming).

54. Khan, Ata M., "Intercity Passenger Transportation: Energy Efficiency and Conservation Case Study", Transportation Planning and Technology (forthcoming).

55. Transport Canada, "Southern Ontario Multimodal Passenger Studies", in Association with Ministry of Transportation and Communications, Ontario, TP 2182, Ottawa, 1979.

56. Hannon, B., "Energy, Employment, and Transportation, World Resources: The Forensic Quarterly, V. 49, September 1975. pp. 497-512.

57. Nelson, R.A., D. Goldman, and E.J. Ward, "High Speed Rail Passenger Transportation in Six Countries and The Northeast Corridor of the United States", Federal Railroad Administration, Department of Transport, Washington, D.C. 1979.

58. Hamzawi, S.G., "An Optimization Model for Planning and Design of Transport Systems", Ph.D. Thesis, Department of Civil Engineering, Carleton University, Ottawa, 1977.

59. Organization for Economic Cooperation and Development, "The Future of European Passenger Transport", Paris, 1977.

FIGURES

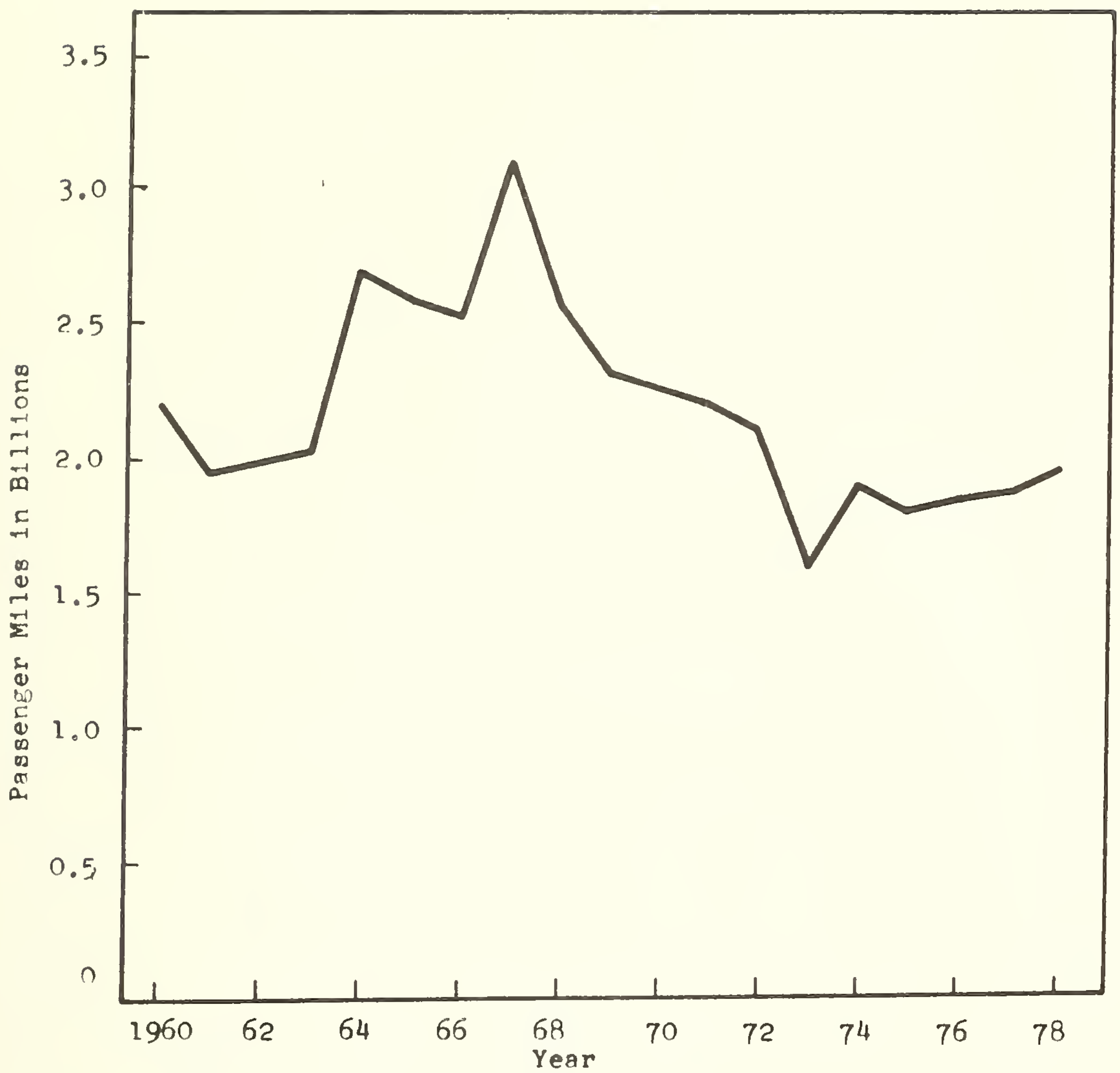

Figure II.1: Railway Passenger Miles

Source: Statistics Canada Catalogue No. 52-207 (1960-78)

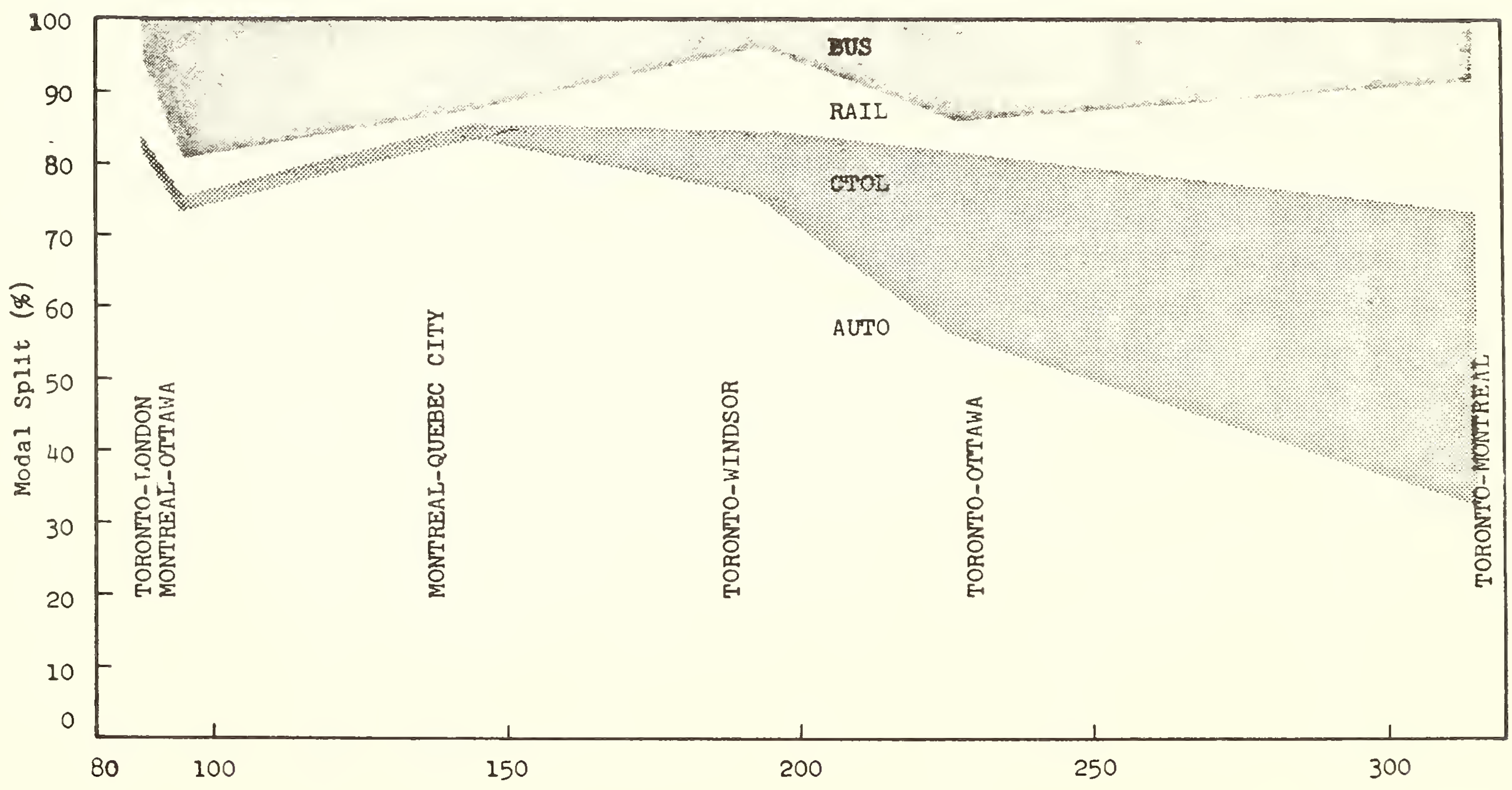

Figure II.2: Modal Split vs. Distance (1976)

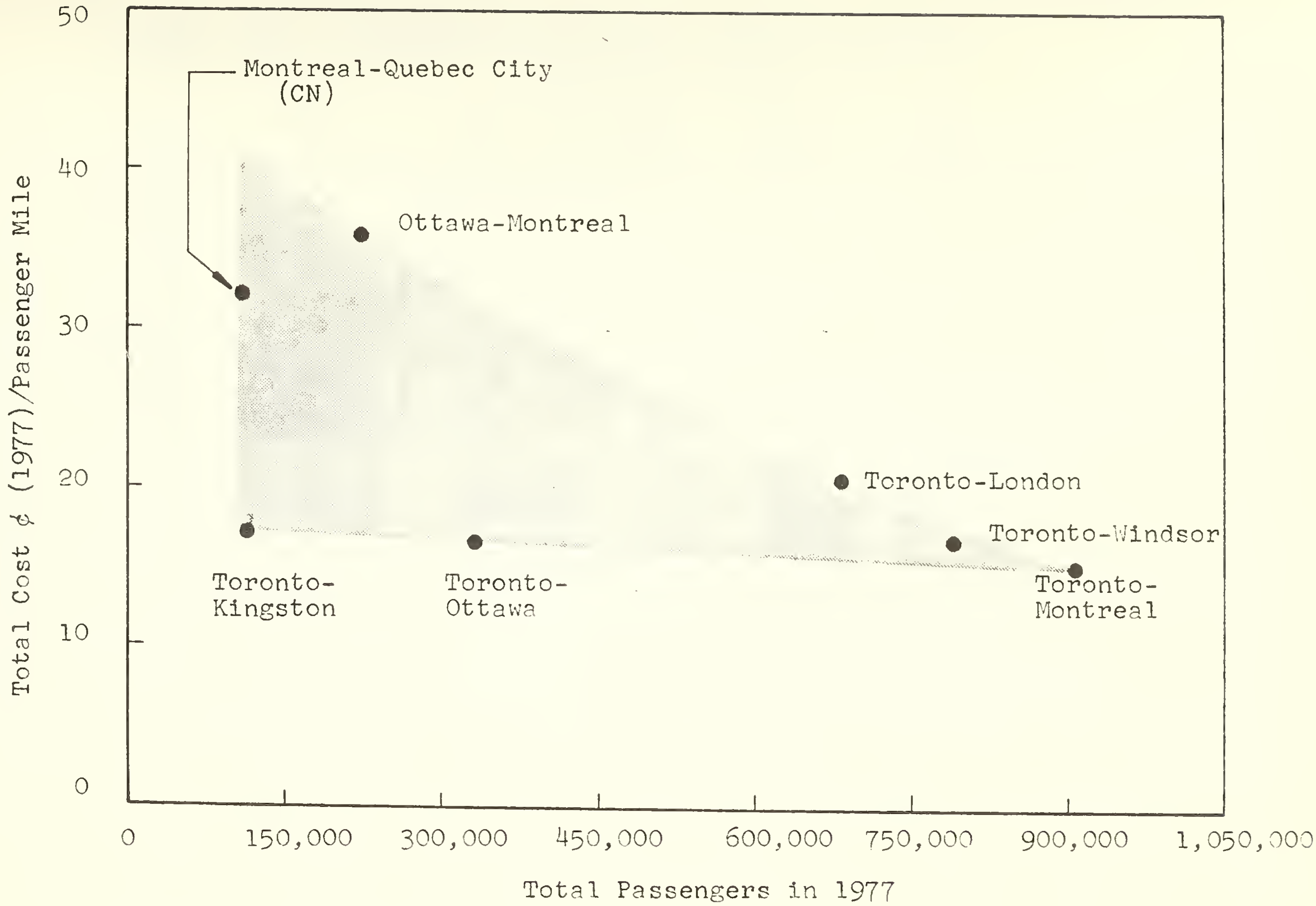

Figure II.3: Passenger Railway Cost (¢/Pass. mile) vs. Demand for Rail Travel

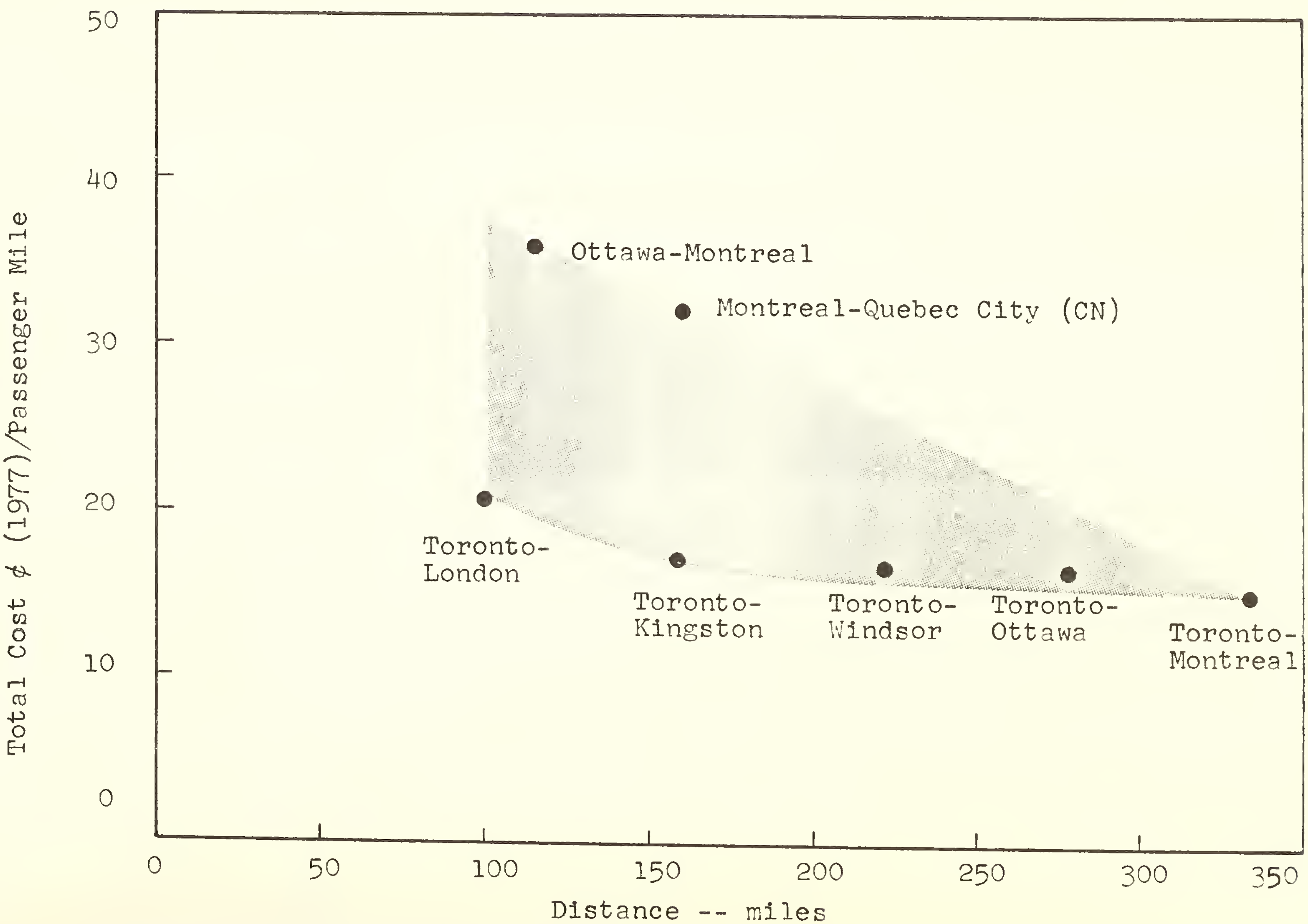

Figure II.4: Passenger railway cost (¢/Pass. mile) vs. Distance.

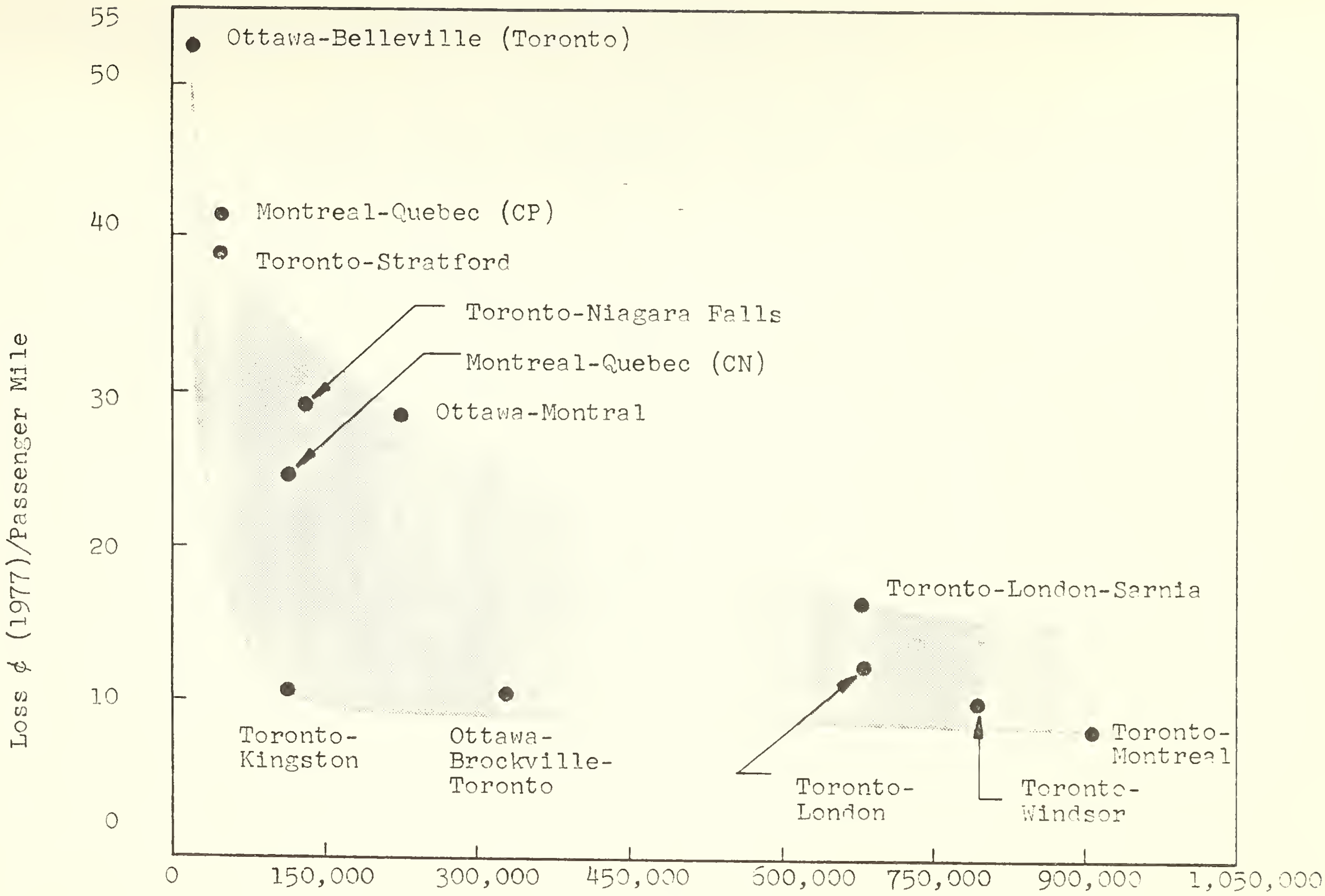

Figure II.5: Passenger Railway Loss (¢/Pass. mile) vs. Demand for Rail Travel

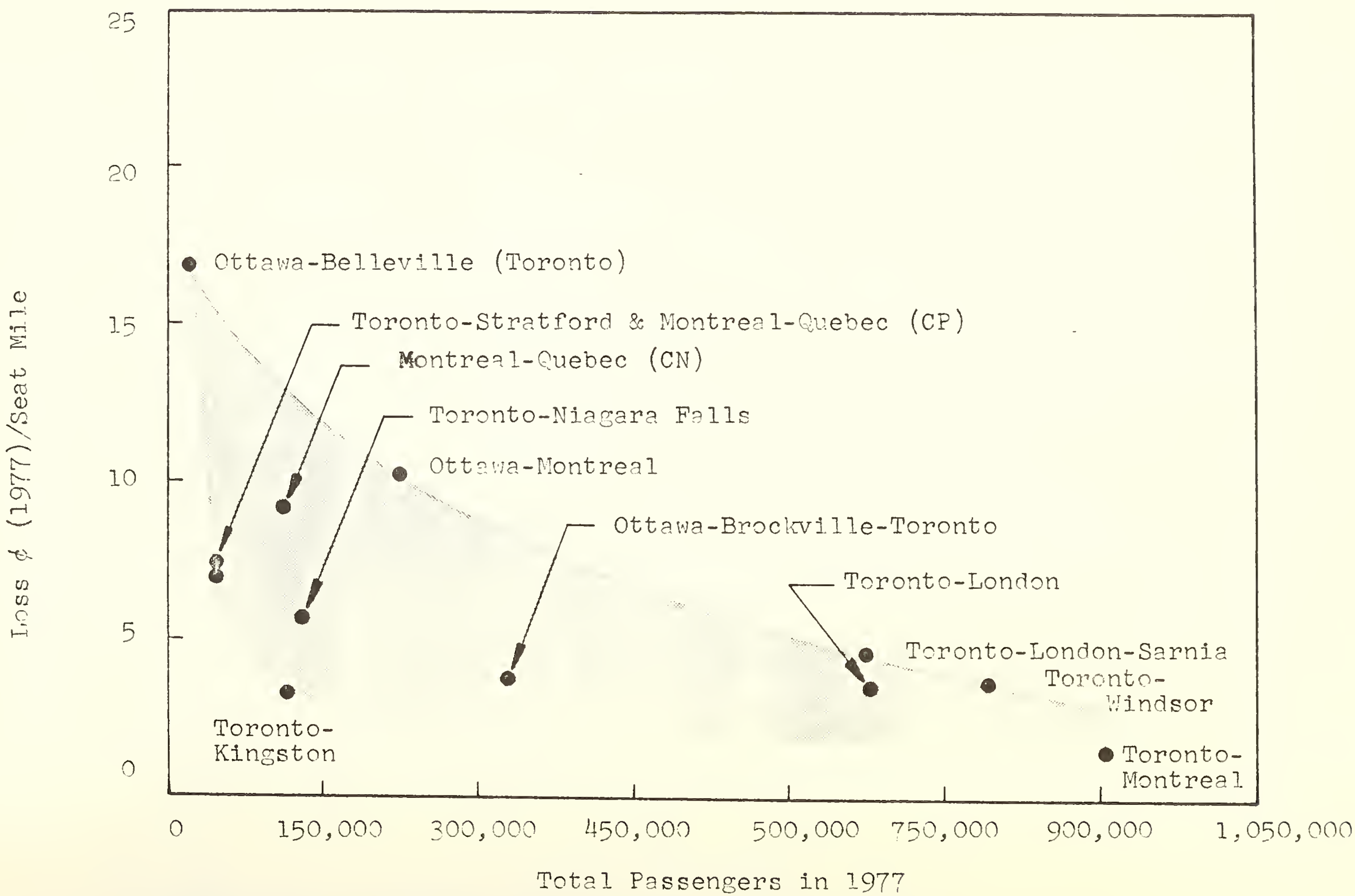

Figure II.6: Passenger Railway Loss (¢/Seat mile) vs. Demand for Rail Travel

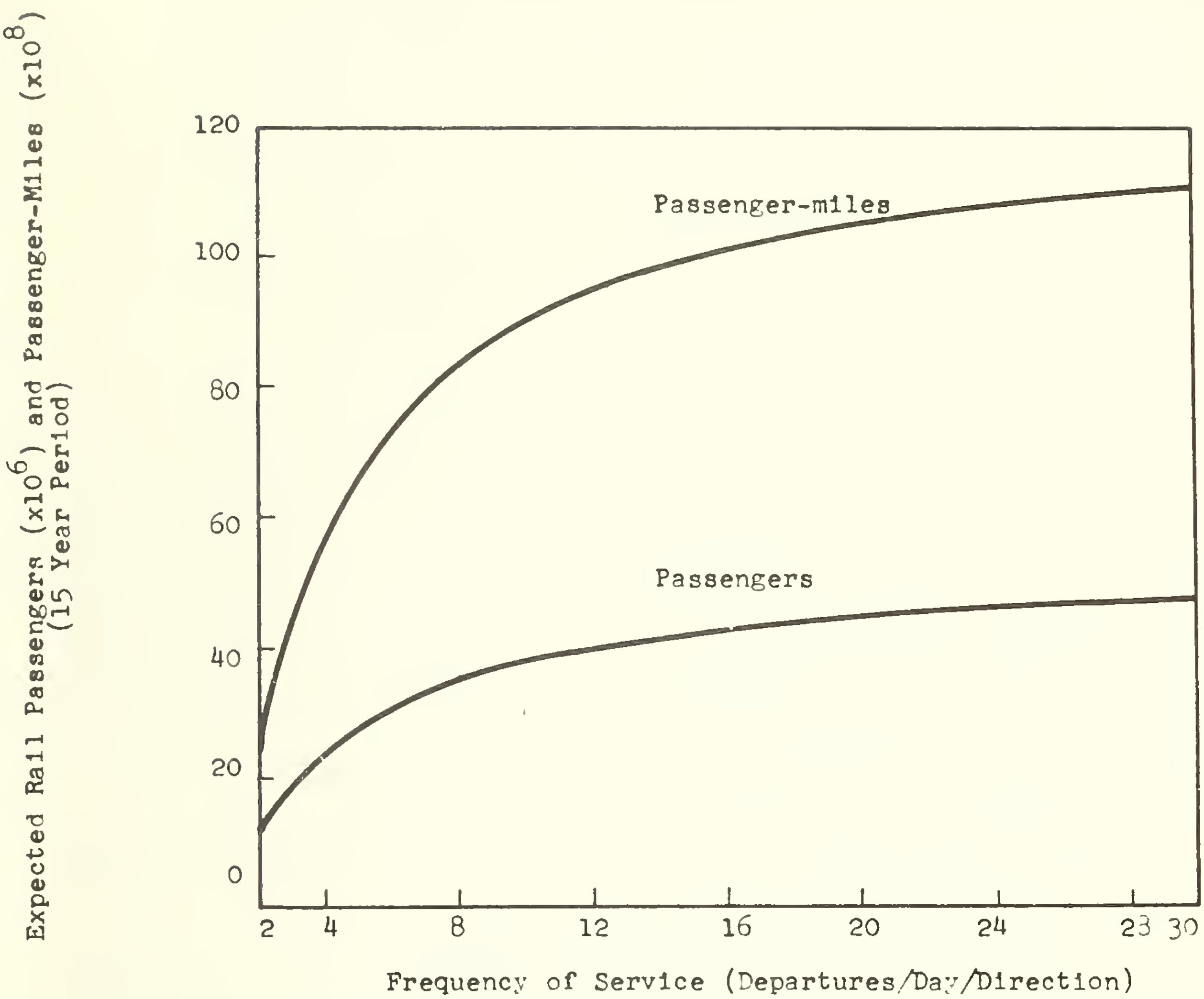

Figure V.1 : Variation of Passenger Volume and Passenger-Miles Due to Changes in Frequency of Service (Toronto-Ottawa-Montreal Corridor)

Source: Reference 58.

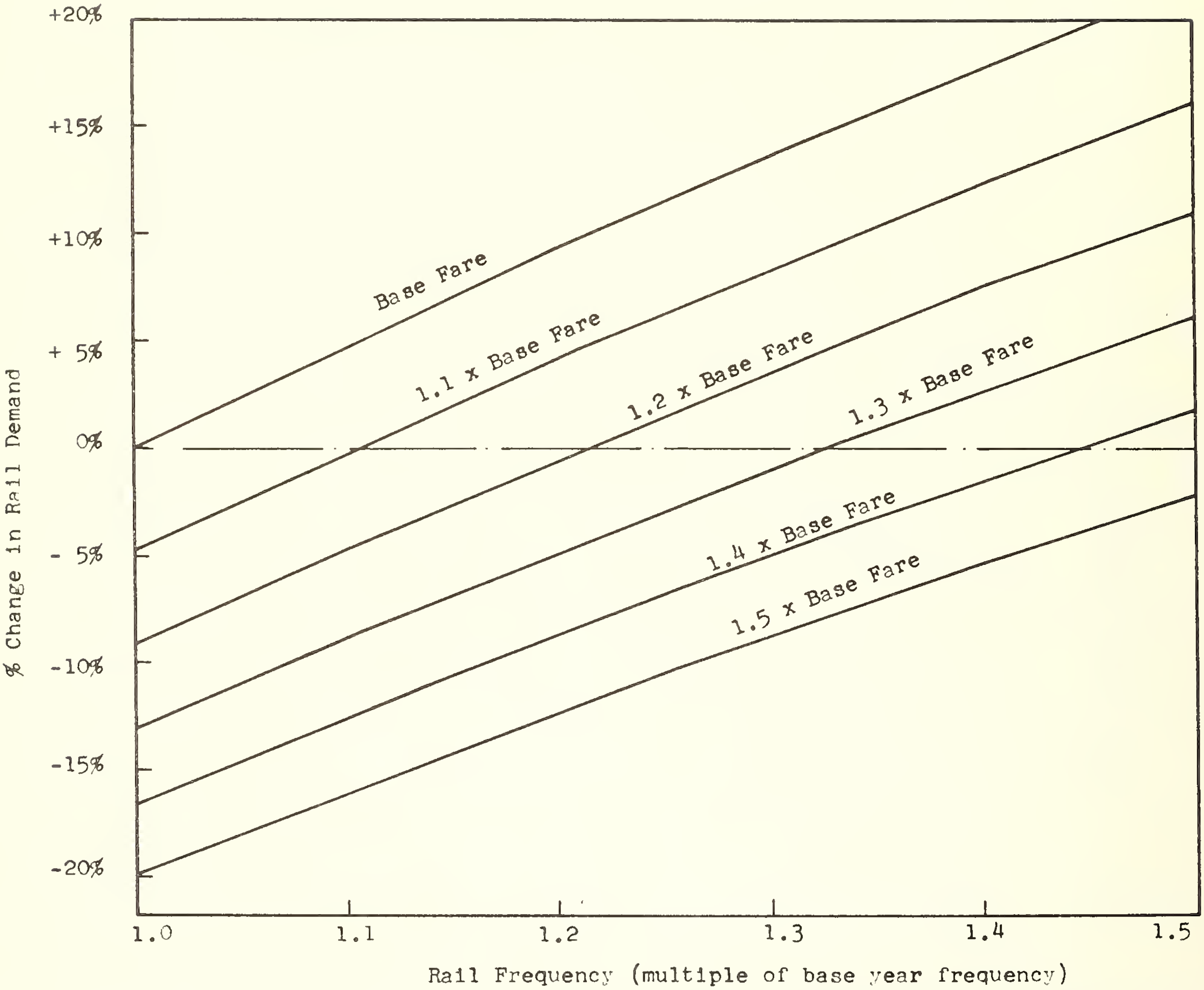

Figure V.2 : Change in Rail Demand vs. Rail Frequency and Fare (Windsor-Quebec Corridor)

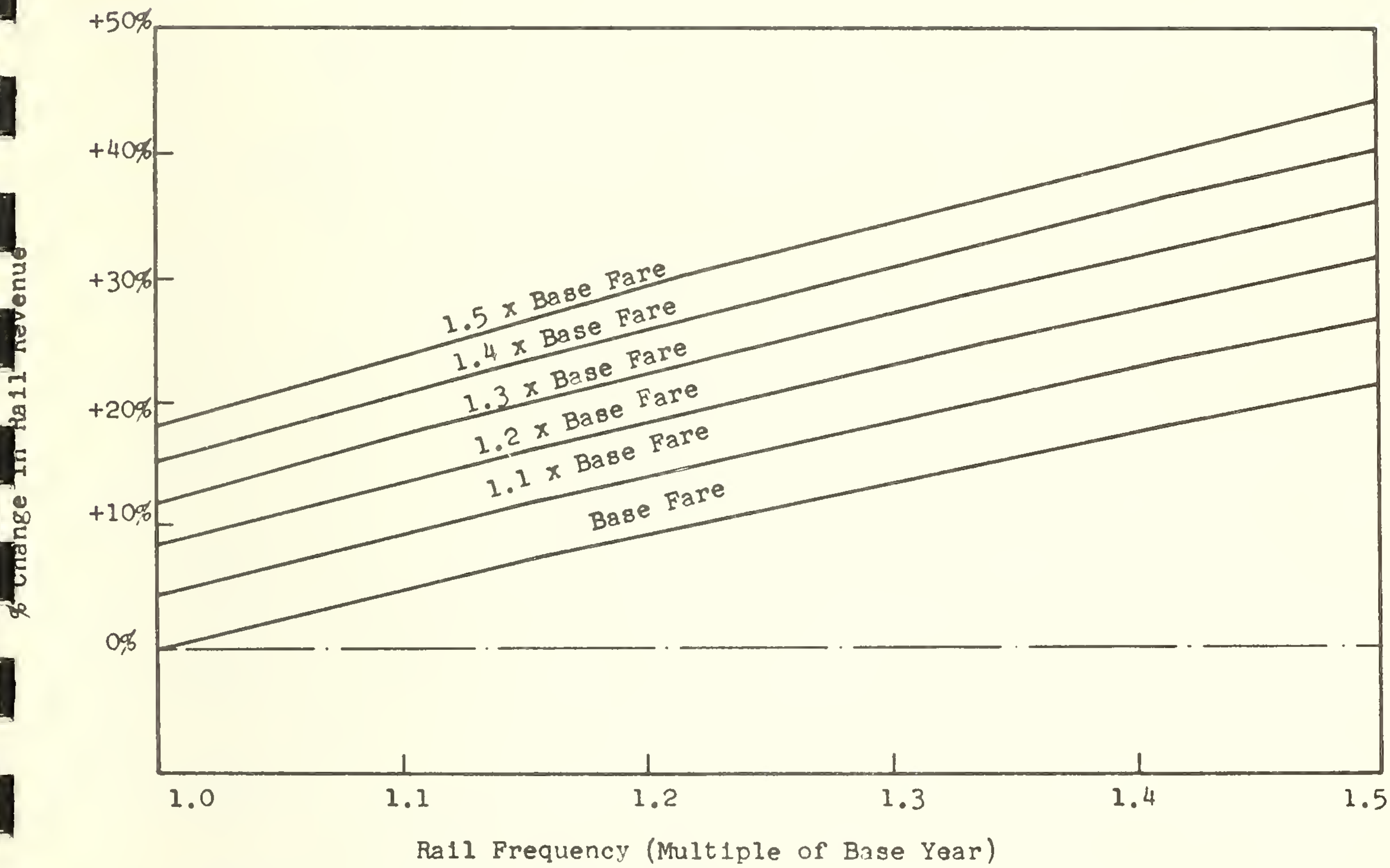

Figure V.3 : Change in RAIL REVENUE vs RAIL FREQUENCY and FARE (Windsor-Quebec Corridor)

Note: Revenue increases shown apply to inelastic portion of the demand curve only.

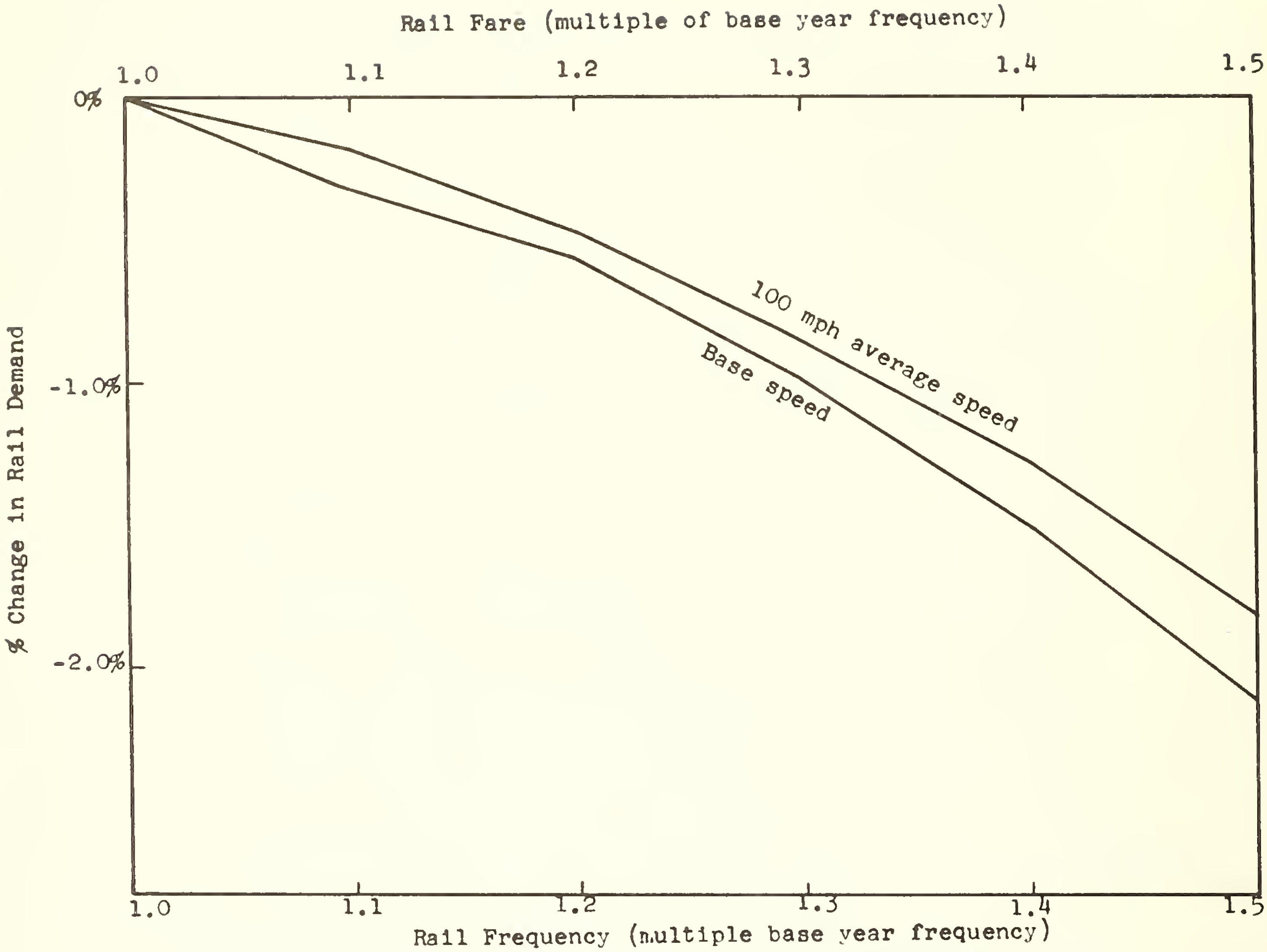

Figure V.4 : Change in Rail Demand Due to Fare and Frequency Changes (Windsor-Quebec Corridor)

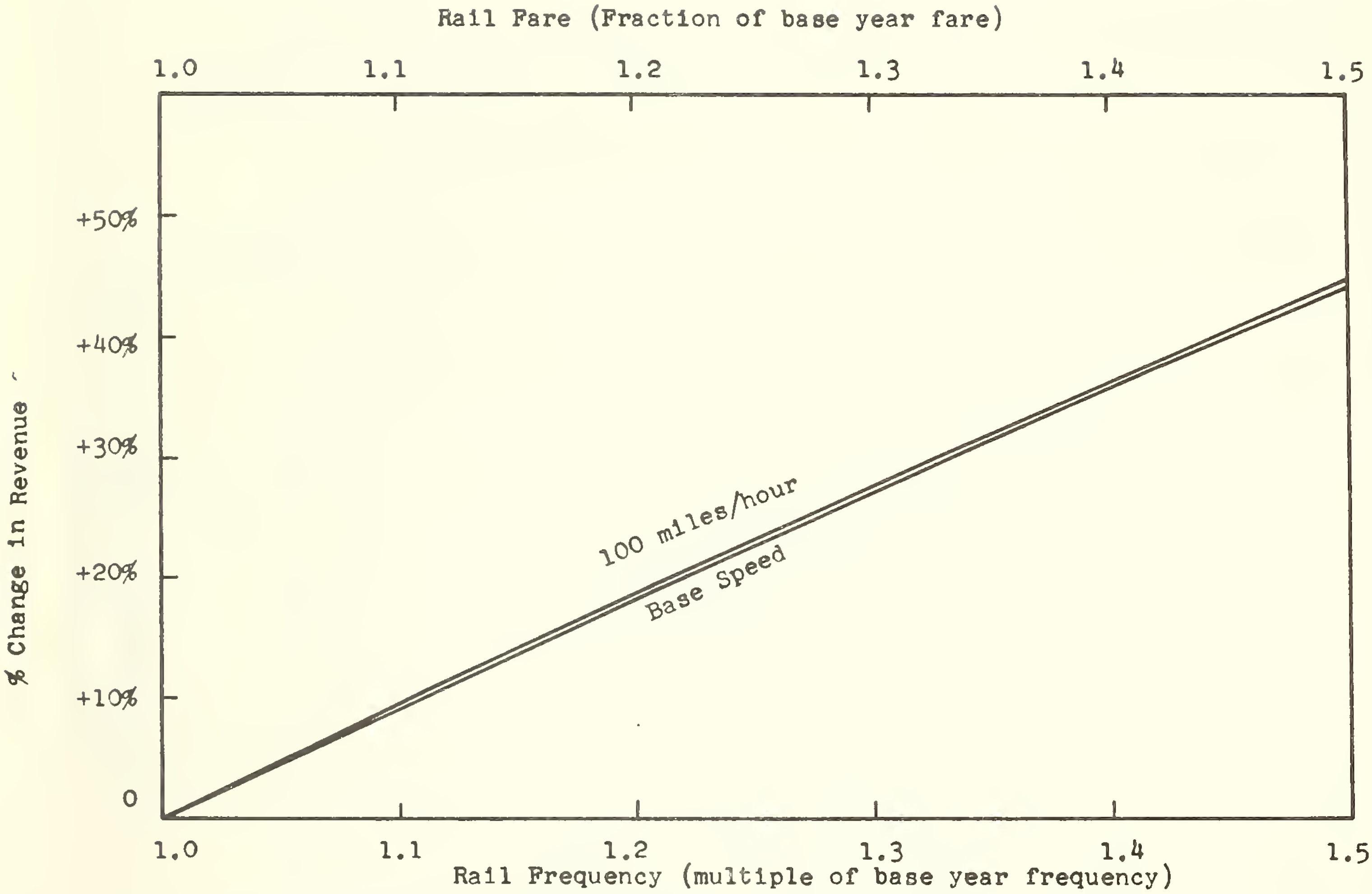

Figure V.5 : Change in Rail Revenue Due to Fare and Frequency Changes (Windsor-Quebec Corridor)

Note: Revenue increases shown apply to inelastic portion of the demand curve only.

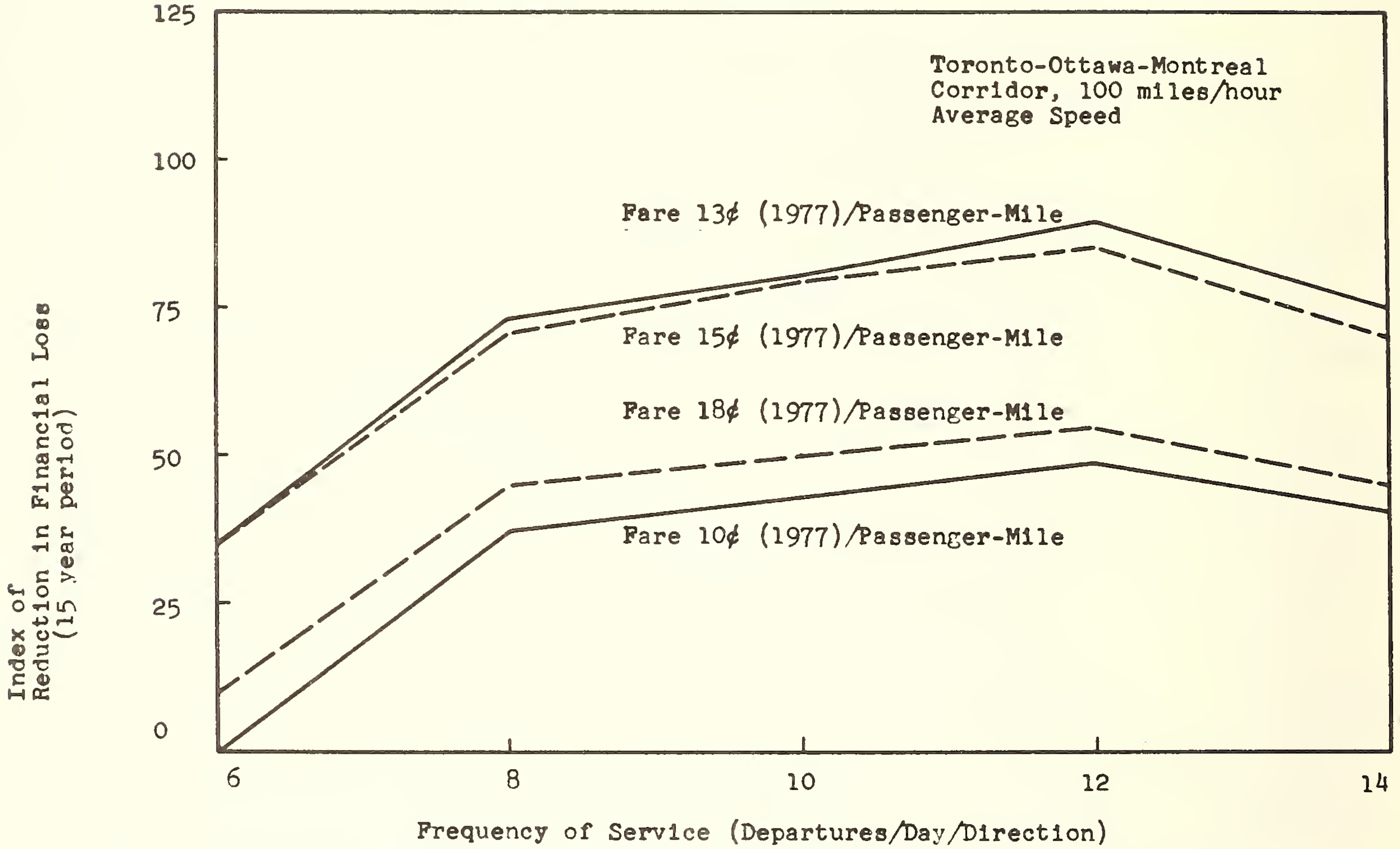

Figure V.6 : Reduction in Financial Loss At Different Combinations of Fare and Frequency

Source: Reference 58 (adapted)

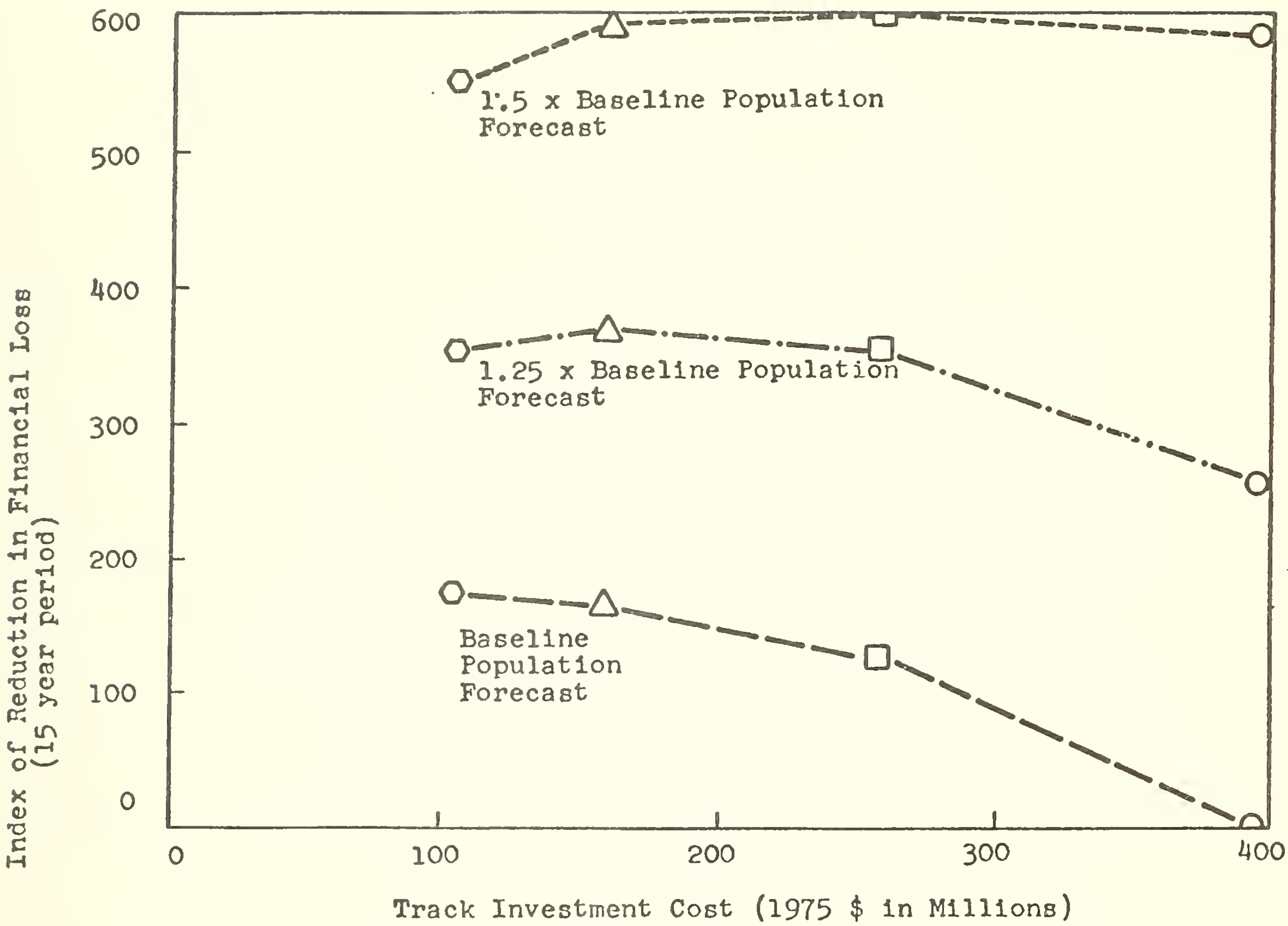

Figure V.7 : Sensitivity of Passenger Rail Deficit to Track Investment Costs and Future Population in the Toronto-Ottawa-Montreal Corridor

Source: Reference 58 (adapted).

TABLES

Table I.1

Interest Groups and Their Concerns

Interest Group	Interest	Issue
Users of passenger railway	-Availability of service of acceptable quality at reasonable cost	-Slow speed, inconvenient service (low frequency and inconvenient schedules) -Quality of equipment during peak times on certain routes
Supplier/Operator of service-- VIA Rail	-To provide attractive, convenient passenger train service while reducing the net cost to the government.	-Legislative, institutional and management framework within which VIA operates is inadequate -Lack of resources for equipment modernization and infrastructure improvements.
Public and special interest groups - Consumers groups	-Protection of consumers interest in case of excessive price increases or lack of service	-Concerns over price increases, service abandonments, inefficient operation, slow pace of service modernization.
- Environmental and resource groups	-Concerns about energy, pollution and land conservation (public interest approach to national development).	
Impact groups - Communities across Canada served by passenger rail	-Service to communities.	-Concern over service abandonment
- Intercity bus transportation	-Minimization of the impacts of VIA's pricing and marketing (promotional) efforts potentially adverse to the bus industry	-Concern over VIA's marketing and fare policies. -Concern over governments subsidy levels for passenger railway.

cont'd.

Table I.1 (cont'd)

Interest Groups and Their Concerns

Interest Group	Interest	Issue
Impact groups (cont'd) -Railway employees	-To minimize adverse effects of service changes and modernization.	-Concern over the impacts of service rationalization (i.e. loss of job, dislocation).
Governments -Federal government	-To ensure that Canadians are provided attractive, convenient passenger train services at minimum cost	-Concern with very high degree of subsidization.
-Provincial governments	-To ensure the continuity and efficiency of of passenger rail service, balanced transportation -Positive externalities including industrial and employment benefits.	-Concern over lack of adequate service to communities -Intermodal transportation opportunities.

Table II.1

Modal Distribution of Passenger Transportation

Mode	1965	1967	1975	1977
Rail	3%	3%	1%	1%
Bus and Urban transit	3%	3%	3%	2.5%
Air	6%	7%	12%	12.5%
Auto	88%	87%	84%	84%
	100%	100%	100%	100%
Total Passenger Miles (Billions)	91	104	167	175
Total Passenger Kilometers (Billions)	146	167	269	282

Source: References 17,20

Table II.2

Estimated Domestic Modal Patronage by Length of Intercity Trip
1975 Millions

Mode	Up to 500 miles	500-1,000 miles	> 1000 miles	All Trips
Auto	187	2	1	190
Air	6	2	3	11
Bus	8	1	1	10
Rail	2	1	1	4
Total	203	6	6	215

Source: Reference 22.

Table II.3

Costs and Revenue of Passenger Train Services
(Total of all Services)

	1972	1974	1977	1979
Total Costs	$202,795,900	$256,563,800	$347,268,000	$335,624,000
Revenues	$ 75,721,100	$ 89,669,600	$ 99,436,000	$103,203,000
Loss	$127,074,800	$166,894,200	$247,832,000	$232,421,000
Revenue as a % of total costs	37.3%	34.9%	28.6%	30.8%

Source: References 6,21,23

Table II.4

Costs and Revenues of Selected Passenger Train Services

	1972	1974	1977
Windsor-Quebec City Corridor			
Total Costs	$46,800,000	$67,700,000	$106,403,000
Revenue	$25,678,000	$31,147,000	$ 40,485,000
Loss	$21,122,000	$36,553,000	$ 65,918,000
Revenue as a % of total cost	54.9%	46.0%	38.0%
Transcontinental			
Total Costs	$122,414,200	$152,518,300	$185,794,000
Revenues	$ 44,101,900	$ 51,441,000	$ 51,850,000
Loss	$ 78,312,300	$101,077,300	$133,944,000
Revenue as a % of total cost	36.0%	33.7%	27.9%

Source: References 21,23

Table II.5

Financial Characteristics of Passenger Train Services - 1977

Service	Costs (% of Total)	Revenue (% of Total)	Loss (% of Total)	% Revenue/ Cost
Intercity Corridor Windsor-Quebec City	30.6	40.7	26.6	38.0
Transcontinental Services	53.5	52.1	54.1	27.9
Intercity, Regional and Local	12.3	5.8	14.9	13.6
Remote Services	3.1	1.2	3.8	11.4
Discontinued Services	0.5	0.1	0.6	5.2
	100.0	100.0	100.0	

Source: References 23,24,25

Table II.6

Passenger Railway Statistics -- Total System

	1972*	1979**
Passengers	5.91 million passengers	5.95 million passengers
Revenue Passenger miles	1,660 million pass. miles	1,594 million pass. miles
Load Factor	43.7%	43.9%
% Revenue/Cost	37.3%	30.7%
Average trip Length	281 miles	268 miles
Break-even L.-F.	117.0%	142.4%
Loss per Passenger mile (current $)	7.7¢/Pass. mile	15.6¢/Pass. mile
1972$	7.7¢/Pass. mile	8.6¢/Pass. mile

Source: * Reference 21
** Reference 6

Table II.7

Windsor-Quebec City Rail Services: Traffic and Revenue Statistics

Year	Traffic										
	Revenue Psgrs. ($x10^3$)	Revenue Psgrs. ($x10^6$)	Load Factor (%)	Average Trip Length (Miles)	Revenue ($\$x10^3$)	Revenue Per Passenger		Passenger Per Passenger Mile		Revenue Per Seat Mile	
						Curr. $	1972 $	Curr. $	1972 $	Curr. $	1972 $
1972	3,640	544	47%	149.4	$25,678	$7.05	$7.05	4.7¢	4.7¢	2.2¢	2.2¢
1973[1]	3,071	461	40%	150.4	22,010	7.17	6.67	4.8	4.4	1.9	1.7
1974	3,479	537	38%	154.4	31,147	8.95	7.50	5.8	4.9	2.2	1.9
1975	3,024	513	38%	169.7	31,046	10.27	7.77	6.1	4.6	2.3	1.7
1976[2]	3,208	524	38%	164.8	35,403	11.04	7.82	6.8	4.8	2.6	1.8
1977[3]	3,400	554[4]	39%	162.8	38,968	11.46	7.48	7.0	4.6	2.7	1.8
Change 1972-77	-6.5%	1.8%	-17.0%	9.0%	51.8%	62.5%	6.1%	48.9%	-2.1%	23%	-18.2%

1. Strike in 1973
2. CN data derived from PARRS, Year to date 1976
3. CN data derived from PARRS, Year to date 1977
4. Includes an estimate of CP Montreal-Quebec service.

Note: Service operated primarily with RDC equipment on the following links: Toronto-Kingston, Toronto-Niagara Falls, Toronto-Stratford, Montreal-Quebec (CP).

Source: References 23,24,25

Table II.8

Windsor-Quebec City Rail Services: Traffic and Cost Statistics

Year	Traffic: Revenue Psgrs. ($x10^3$)	Traffic: Revenue Psgr. Mile ($x10^6$)	Traffic: Load Factor (%)	Average Trip Length (Miles)	Total Costs ($\$x10^6$)	Cost per Passenger Curr. $	Cost per Passenger 1972 $	Cost per Passenger Mile Curr. $	Cost per Passenger Mile 1972 $	Cost per Seat Mile Curr. $	Cost per Seat Mile 1972 $
1972	3,640	544	47%	149.4	$46.8	$12.86	12.86	8.7¢	8.7¢	4.1¢	4.1¢
1973	3,071	461	40%	150.4							
1974	3,479	537	38%	154.4	67.7	19.46	16.49	13.2	11.2	5.0	4.2
1975	3,024	513	38%	169.7	76.0	25.13	18.89	15.3	11.5	5.8	4.4
1976	3,208	524	38%	164.8	94.1	29.33	20.65	18.7	13.2	7.1	5.0
1977	3,400	554	39%	162.8	106.4	31.41	20.66	19.2	12.6	7.5	4.9
Change 1972-77	-6.5%	1.8%	-17.0%	9.0%	127.4%	144.3%	60.7%	120.7%	44.8%	82.9%	19.5%

Source: References 23,24,25

Table II.9

Montreal-Toronto Passenger Train Financial and Service Data

	1972	1974	1977	1978
Revenue Passengers	1,181,774	1,052,492	905,211	1,141,700
Revenue Passenger miles (x1000)	296,692	277,029	249,087	317,400
Total route mileage (miles)	335	335	335	335
Average trip length (miles)	251	263	275.2	278.0
Load factor (%)	56.1	52.0	50.2	61.7
Revenue as a % of total Cost	63.5	60.3	49.5	48.3
Break-even load factor (%)	88.4	86.1	101.4	127.7
Labour cost as a % of total cost	58.8	50.2	NA	49.2
Loss per passenger-mile (¢)				
Current $	2.7	3.8	7.7	6.7
1972 $	2.7	3.2	5.0	4.0
Loss per seat-mile (¢)				
Current $	1.5	2.0	3.9	4.1
1972 $	1.5	1.7	2.5	2.5

NA -- Not Available

Table II.10

Montreal-Ottawa Passenger Train Financial and Service Data

	1972	1974	1977	1978
Revenue Passengers				
CN	248,220	210,213	224,526	270,700
CP	81,225	72,387		
Total	329,475	282,600		
Revenue Passenger Miles (x1000)				
CN	27,308	22,516	24,302	30,856
CP	4,851	4,194		
Total	32,159	26,710		
Route Mileage (Trip length) Miles				
CN	115.5 (110.0)	115.5 (107.1)	115.5 (107.0)	115.5 (114.0)
CP	125.5 (59.7)	132.3 (57.9)		
Combined	-			
Load factor (%)				
CN	48.7	37.1	36.2	36.9
CP	59.5	29.3	36.2	
Combined	50.1	35.7		
Revenue as a % of total cost				
CN	40.3	32.2	21.4	23.9
CP	38.9	37.9	28.9	
Combined	40.1	32.8	22.7	
Break-even load factor (%)	(121.0 CN) (152.6 CP) (125.0 Comb.)	(115.5 CN) (78.0 CP) (108.9 Comb.)	(163.5 CN) (1.28 CP) (159.8 Comb.)	154.8
Labour cost as a % of total cost	(62.7 CN) (53.3 CP)	(53.7 CN) (59.8 CP)	NA	55.6
Loss per passenger-mile (¢)				
Current $	(7.6 CN) (7.2 CP) (7.6 Comb.)	(13.9 CN) (9.1 CP) (13.1 Comb.)	NA	22.5
1972 $	(7.6 Comb.)	(11.0 Comb.)		13.5
Loss per seat-mile (¢)				
Current $	(3.7 CN) (4.3 CP) (3.8 Comb.)	(5.2 CN) (2.7 CP) (4.7 Comb.)		8.3
1972 $	(3.8 Comb.)	(3.9 Comb.)		(5.0)

Table II.11

Montreal/Toronto-Vancouver(Transcontinental)Train
Financial and Service Data

	1972	1974	1977	1978
Revenue Passengers				
CN	571,472	456,800		474,830 Trans Cont. 9 months plus 168,000 for Toronto-Barrie segment
CP	302,791	312,293		
Total	874,263	769,093	NA	
Revenue Passenger Miles (x1000)				
CN	494,571	395,389		374,805.4 Trans. Cont., 9 months, plus 5,900.0 for Toronto-Barrie segment
CP	232,307	251,498		
	726,878	646,887	NA	
Total route Mileage (miles)				
CN	3200.0	3200.0	NA	NA
CP	3139.4	3139.4	NA	NA
Average trip length (miles)				
CN	865.4	865.6	NA	789 Transcont
CP	767.2	805.3	NA	35 Toronto-Barrie
Load Factor (%)	(51.9%CN) (53.2%CP) (52.3%Comb.)	(47.0%CN) (53.9%CP)	(47.0% assumed)	(47.0% assumed)
Revenue as a % of total cost	(36.1%CN) (38.7%CP) (37.0%Comb.)	(32.9%CN) (39.7%CP) (35.3%Comb.)	(28.8%CN) (29.1%CP) (28.9%Comb.)	(26.5%CN)
Break-even load factor (%)	(143.8%CN) (137.6%CP) (141.3%Comb.)	(143.0%CN) (137.2%CP)	(162.5%)	(177.4%)
Labour cost as a % of total cost	(58.1%CN) (56.3%CP)	(51.8%CN) (59.3%CP)	NA	52.8%
Loss per passenger mile				
Current $	(7.1CN) (8.2CP) (7.5Comb.)	(12.0CN) (9.3CP) (10.9Comb.)	NA	14.4
1972 $	(7.5Comb.)	(9.1Comb.)	NA	8.6
Loss per seat-mile (¢)				
Current $	(3.7CN) (4.4CP) (3.9Comb.)	(5.6CN) (5.0CP)	NA	6.8
1972 $	(3.9Comb.)		NA	4.1

Table II.12

Sydney-Halifax Passenger Train Financial and Service Data

	1972	1974	1977	1978
Revenue passengers	56,418	68,154	NA	64,855
Revenue passenger miles (x1000)	7,912	8,357	NA	7,750.5
Total route mileage (miles)	294.1	294.1	NA	
Average trip length (miles)	140.2	122.6	NA	119.5
Load factor (%)	26.9	25.1	NA	22.0 (Assumed to be the same as in 1975)
Revenue as a % of total cost	25.8%	24.5%	18.5%	24.6%
Break-even load factor (%)	104.2%	102.5%	NA	89.6%
Labour cost as a % of total cost	62.7%	51.0%	NA	49.8%
Loss per passenger-mile (¢)				
Current $	10.8	15.8	NA	17.2
1972 $	10.8	13.2	NA	10.3
Loss per seat-mile (¢)				
Current $	2.9	4.0	NA	3.8
1972 $	2.9	3.4	NA	2.3

Table II.13

Windsor-Quebec City Rail System Cost Characteristics, 1977

Link/Service	Distance (Miles)	Demand (Total Volume)	Load Factor	Average Seats/ Train (1978)	Avoidable Cost ¢/Pass. mile	Total Cost ¢/Pass. mile	Total Cost ¢ seat mile
Toronto-London	100	678,000	29%	246*	18.7	20.5	6.0
Ottawa-Montreal	115	225,000	36%	163	32.7	35.7	12.9
Montreal-Quebec (CN)	157	113,000	37%	NA	29.3	32.0	11.8
Toronto-Kingston	158	114,000	31%	223	16.1	17.0	5.3
Toronto-Windsor	222	793,000	37%	417	15.3	16.7	6.2
Toronto-Ottawa	278	330,500+	37%	234	15.1	16.4	6.1
Toronto-Montreal	334	905,000	50%	447	13.9	15.1	7.6

+ Ottawa-Brockville-Toronto

* Toronto-Sarnia.

Sources: Calculated from data provided in Reference 26. Seats/Train data (1978) is from Transport Canada.

Table II.14

Windsor-Quebec City Rail System Loss Data 1977

Link Service	Total Passengers	Distance (Miles)	Load Factor (%)	Loss per Pass. mile (¢) (Source #1)	Loss per Pass. mile (¢) (Source #2)	Loss/seat-mile (¢) (Source #1)	Loss/seat-mile (¢) (Source #2)
Toronto-London	678,000	100	29%		12.2		3.5
Toronto-London-Sarnia	676,000		28%	16.4		4.6	
Ottawa-Montreal	225,000	115	36%	28.4	29.0	10.2	10.4
Montreal-Quebec							
CN	113,000	157	37%	24.5	25.0	9.1	9.3
CP	48,000		17%	41.3		7.0	
Toronto-Kingston	114,000	158	31%	10.6		3.3	
Toronto-Windsor	793,000	222	37%	10.0	9.9	3.7	3.7
Toronto-Ottawa							
Ottawa-Brockville-Toronto	330,500	278	37%	10.0	10.5	3.7	3.9
Ottawa-Belleville-Toronto	19,300		32%	52.4		16.8	
Toronto-Montreal	905,000	334	50%	8.2	8.4	4.1	4.2
Toronto-Stratford	46,000		19%	38.9		7.4	
Toronto-Niagara Falls	131,000		19%	29.2		5.6	

Source #1: Reference 26 (Calculated from basic data contained in reference 26).

Source #2: Reference 24.

Table II.15

Passenger Train Cost Structure: Windsor-Quebec City Corridor

Cost Category	Corridor 1976 Percent of Total Costs	Toronto-Montreal 1978 Percent of Total Costs			Ottawa-Montreal 1978 Percent of Total Costs		
		Labour Cost	Other Costs	Total	Labour Cost	Other Costs	Total
Train related costs							
Train crew wages	9.8	8.2	-	8.2	10.8	-	10.8
Dining, Parlour & Sleeping Car services	8.1	5.7	5.4	11.1	5.1	3.8	8.9
Fuel	3.6	0	4.4	4.4	-	2.5	2.5
Maintenance-rolling stock	18.0	8.6	8.2	16.8	7.8	5.9	13.7
General transportation (switching)	3.0	2.5	0.6	3.1	4.6	1.0	5.6
Special expenses (i.e. Turbo expenses)		0	4.6	4.6			
	42.5	25.0	23.2	48.2	28.3	13.2	41.5
Passenger System Costs							
Traffic (sales & promotion)	3.0	1.9	0.8	2.7	1.1	0.8	1.9
Station employees & expenses	6.1	5.7	1.0	6.7	7.5	1.3	8.8
	9.1	7.6	1.8	9.4	8.6	2.1	10.7
Fixed Plant and train Control Costs							
Maintenance of fixed plant	4.5	2.6	2.7	5.3	3.0	3.2	6.2
Joint facilities	2.4	0	1.5	1.5	0	0	0
Train control	2.3	1.7	0.3	2.0	2.3	0.5	2.8
	9.2	4.3	4.5	8.8	5.3	3.7	9.0
Administrative, benefits, taxes							
Superintendence & Misc.	8.2	7.1	0.5	7.6	7.8	0.7	8.5
General administration	6.8	4.6	1.1	5.7	5.1	1.2	6.3
Pension and UIC	9.4	0 (negligible)	8.9	8.9	0 (negligible)	10.1	10.1
Taxes and on company service	5.0	0.6	4.3	4.9	0.5	4.5	5.0
	29.4	12.3	14.8	27.1	13.4	16.5	29.9
Depreciation and Cost of Capital							
Depreciation		-	2.3	2.3	-	3.1	3.1
Cost of Capital		-	4.2	4.2	-	5.8	5.8
Depreciation plus cost of capital	9.8		6.5	6.5		8.9	8.9
Total	100.0	49.2	50.8	100.0	55.6	44.4	100.0

Table II.16

Passenger Train Cost Structure: Selected Transcontinental and Regional Services

Cost Category	Montreal/Toronto-Vancouver 1978 Percent of Total Costs			Sydney-Halifax 1978 Percent of Total Costs		
	Labour Cost	Other Costs	Total	Labour Cost	Other Costs	Total
Train related costs						
Train crew wages	8.1	-	8.1	11.6	-	11.6
Dining, Parlour & Sleeping car services	10.6	4.4	15.0	2.5	1.0	3.5
Fuel	0	6.1	6.1	0	2.7	2.7
Maintenance-rolling stock	8.7	7.7	16.4	6.2	16.3	22.5
General transportation (switching)	1.0	0.5	1.5	0.2	1.0	1.2
Special expenses						
Equipment rental	-	0.4	0.4	-	-	-
Bridge expenses	-	0(negligible)	0	-	-	-
	28.4	19.1	47.5	20.5	21.0	41.5
Passenger system costs						
Traffic (sales, promotion)	2.4	0.9	3.3	1.4	0.6	2.0
Station employees & expenses	4.9	0.8	5.7	10.5	1.8	12.3
	7.3	1.7	9.0	11.9	2.4	14.3
Fixed plant and train control costs						
Maintenance of fixed plant	2.7	2.7	5.4	2.6	3.7	6.3
Joint facilities	0	0.4	0.4	0	0	0
Train control	1.4	0.2	1.6	4.0	0.6	4.6
	4.1	3.3	7.4	6.6	4.3	10.9
Administrative, benefits, taxes						
Superintendence & Misc.	7.4	0.4	7.8	5.9	0.7	6.6
General administration	5.0	1.2	6.2	4.6	1.1	5.7
Pension and UIC	0(negligible)	9.6	9.6	0(negligible)	9.1	9.1
Taxes and on company service	0.6	3.6	4.2	0.7	3.9	4.6
	13.0	14.8	27.8	11.2	14.8	26.0
Depreciation	-	3.2	3.2	-	2.5	2.5
Cost of Capital	-	5.1	5.1	-	4.8	4.8
Total	52.8	47.2	100.0	50.2	49.8	100.0

Table II.17

Infrastructure and Non-infrastructure Costs of Passenger Railway: Selected Services 1978

Service & Cost Type	Labour Costs % of Total	Other Costs % of Total	Total Costs %
Montreal-Toronto			
Infrastructure costs	4.3	11.1	15.4
Non-infrastructure costs	44.9	39.7	84.6
Total	49.2	50.8	100.0
Montreal-Ottawa			
Infrastructure costs	5.3	11.9	17.1
Non-infrastructure costs	50.4	32.5	82.9
Total	55.7	44.4	100.0
Montreal/Toronto-Vancouver			
Infrastructure costs	4.1	8.6	12.6
Non-infrastructure costs	48.7	38.6	87.4
Total	52.8	47.2	100.0
Sydney-Halifax			
Infrastructure costs	6.6	10.9	17.5
Non-infrastructure costs	43.6	38.9	82.5
Total	50.2	49.8	100.0

Table II.18

Windsor-Quebec City Corridor Intercity Transportation: Supply and Travel Characteristics 1977

Link	Travel Mode	Distance (Miles)	Travel volume O-D	Travel volume Total	L.F. (%)	Travel Time Line Haul	Travel Time Door-to-door	User Cost Line Haul Fare	User Cost Door-to-Door	Frequency (Daily)
Toronto-London	Rail	100	275,000	678,000	29	1:55	3:03	8.25	11.15	8
	Air	90	5,000	31,000	44	0:35	2:30	30.00	33.55	12
	Bus	124	81,000		55	2:20	3:25	7.50	10.35	10
	Auto	124	919,000		29	-	2:20	-	12.50	-
	Total		1,280,000							
Ottawa-Montreal	Rail	115	188,000	225,000	36	2:00	3:10	7.75	10.25	5
	Air	96	60,000	498,000	53	0:35	2:10	30.00	33.40	11
	Bus	115	734,000		69	2:25	3:35	7.40	9.65	18
	Auto	115	2,305,000		30	-	2:25	-	11.50	-
	Total		3,287,000							-
Montreal-Quebec City	Rail	157	80,000	113,000	37	3:25	4:30	11.00	14.10	8
	Air	148	115,000	432,000	62	0:40	2:15	33.00	36.15	6
	Bus	149	801,000		55	2:45	3:50	11.60	14.60	17
	Auto	149	4,621,000		34	-	2:45	-	15.00	-
	Total		5,617,000							-
Toronto-Windsor	Rail	222	222,000	790,000	37	3:50	5:00	15.00	15.95	5
	Air	197	88,000	161,000	61	0:45	2:35	43.00	44.40	4
	Bus	232	375,000		55	4:55	6:05	13.65	16.55	10
	Auto	232	258,000		34	-	4:55	-	23.25	-
	Total		943,000							-
Toronto-Ottawa	Rail	278	84,000		37	5:30	6:45	16.50	19.55	3
	Air	231	487,000	771,000	57	0:45	2:40	47.00	50.60	16
	Bus	249	260,000		41	5:05	6:15	15.75	18.60	13
	Auto	249	491,000		32	-	5:35	-	24.80	-
	Total		1,322,000							-

Table II.18 (cont'd)

Link	Travel Mode	Distance (Miles)	Travel volume O-D	Travel volume Total	L.F. (%)	Travel Time Line Haul	Travel Time Door-to-door	User Cost Line Haul Fare	User Cost Door-to-Door	Frequency (Daily)
Toronto-Montreal	Rail	334	458,000	905,000	50	4:35	5:45	22.25	25.25	7
	Air	321	924,000	11,703,000	67	1:05	3:10	56.00	60.00	24
	Bus	340	180,000		43	6:35	7:50	19.85	23.30	7
	Auto	340	803,000		34	-	6:35	-	33.50	-
	Total		2,365,000							-

Note: For all modes and for rail, note the following trip purpose data for 1977.
Montreal-Quebec: 31% business (all modes), 62% business (rail)
Montreal-Ottawa: 32% business (all modes)
Montreal-Toronto: 44% business (all modes)
Ottawa-Toronto: 40% business (all modes)
Montreal-Ottawa-Toronto Corridor: 31% business (rail)
Toronto-London: 23% business (rail)

Source of Data: Reference 26 and Transport Canada Data

Table 11.19

Windsor-Quebec Corridor Intercity Passenger Transportation: Modal Costs and Subsidy Characteristics 1977

Link	Travel Mode	Load Factor %	User Cost/Fare ¢Pass.mile Line haul (Fare)	User Cost/Fare ¢Pass.mile Door-to-Door	Modal Cost ¢Pass.mile Total	Total Loss (¢Pass.mile)
Toronto-London	Rail	29	8.3	11.2	20.5	-12.2
	Air	44	33.4	37.3	38.1	- 4.7
	Bus	55	6.0	8.4	4.7	+ 1.3
	Auto^x	29	(10.1 door-to door)	10.1	13.2	- 0.6*
Ottawa-Montreal	Rail	36	6.7	8.9	35.7	-29.0
	Air	53	31.3	34.8	33.9	- 2.6
	Bus	69	6.5	8.5	4.3	+ 2.2
	Auto^x	30	(10.0 door-to door)	10.0	12.4	- 0.6*
Montreal-Quebec City	Rail	37	7.0	8.9	32.0	-25.0
	Air	62	22.3	24.4	24.4	- 2.1
	Bus	55	7.8	9.8	5.5	+ 2.3
	Auto^x	34	(10.0 door-to door)	10.0	9.8	- 0.6*
Toronto-Windsor	Rail	37	6.8	7.2	16.7	- 9.9
	Air	61	21.9	22.5	19.1	+ 2.8
	Bus	55	5.9	7.1	4.7	+ 1.2
	Auto^x	34	(10.0 door-to door)	10.0	10.9	- 0.6*
Toronto-Ottawa	Rail		5.9(6.5)**	7.1	16.4	-10.5
	Air	57	20.4	22.0	17.5	+ 2.9
	Bus	41	6.4	7.5	6.5	- 0.1
	Auto^x	32	(10.0 door-to door)	10.0	11.7	- 0.6*

Table II.19 (cont'd)

Link	Travel Mode	Load Factor %	User Cost/Fare ¢Pass.mile Line haul (Fare)	User Cost/Fare ¢Pass.mile Door-to-Door	Modal Cost ¢Pass.mile Total	Total Loss (¢Pass.mile)
Toronto-Montreal	Rail	50	6.7	7.6	15.1	- 8.4***
	Air	67	17.4	18.7	13.8	+ 3.6+
	Bus	43	5.9	6.9	6.2	- 0.3++
	Auto[x]	34	(9.9 door-to door)	9.9	10.9	- 0.6*

Source: Calculated from data contained in Reference 26
* 1978 estimate based on research by Z. Haritos
\+ A subsidyoof 1.8¢/Passenger mile in 1978 was estimated elsewhere (MOT Internal document)
++ Zero subsidy for bus is commonly stated (MOT Internal Document)
** 1978 fare (¢/pass.mile)
*** This estimate of loss (¢/pass. mile) is slightly higher than shown in Table II.9. The difference arises due to different sources of information.
x Auto cost shown is perceived cost only.

Table V.1

Conditions Favourable to Effective Management of Rail Passenger Services

	Canada	U.S.A.	U.K.	France	Italy	Japan
. Reasonable autonomy in fare policies, marketing, promotions	X	X	X	X	X	X
. Local industrial base, R&D for equipment availability			X	X	X	X
. Complete control/ownership of rolling stock	X	X	X	X	X	X
. Complete control/ownership of track			X	X	X	X
. Ownership/exclusive or almost exclusive use of track in important corridors		X	X	X	X	X
. Complete control/ownership of rolling stock maintenance facilities		X	X	X	X	X
. Complete control/ownership of stations		X	X	X	X	X
. Financial continuity		X	X	X	X	X
. Latitude in planning and demonstration	X	X	X	X	X	X
Number checked	3	7	9	9	9	9

Source: Based on information contained in references 6,18,19 & 40-45.

Table V.2

A Matrix of Conditions Favourable to Rail Passenger Patronage Based on the Experience of Corridors in Six Countries

	Paris-Bordeaux	Tokyo-Osaka	Hannover-Munich	Rome-Milan	London-Manchester/Liverpool	Montreal-Toronto
High population density (2,000 per sq. mile plus)		X			X	
High Per Capital Income ($5,000 plus, 1977 U.S.$)	X	X	X			X
High Proportionoof Households Above $12,500 (24% plus) (1977U.S. $)			X	X		
No Bus Competition	X	*	X	X		
High Air Fares (20¢ per mile plus) (1977 U.S. $)	X		X			
Low Auto ownership (below 26/100 persons)		X			X	
High Speed Rail (90 mph plus average)	X	X				
Low Rail Fares (below 10¢ per mile)	X			X		X
Number checked	5	4	4	3	2	2
Propensity for Rail Travel, Rail Passenger Miles per Year per Capita of Corridor Population	245	343	83	303	70	45

* In fact there is practically no bus competition in the Tokyo-Osaka corridor, but it's absence is not a matter of national policy but rather bus' inability to compete with rail.
Source: Reference 57.

Table V.3

Travel Simulation Results -- The Windsor-Quebec City Corridor
(Origin-Destination Traffic Only)*

Simulation Run Description	Demand for All Modes (Millions) (O-D Traffic Only)	Modal Split (%) Auto	Air	Rail	Bus	Rail Demand (Millions) (O-D Traffic Only)
Base Case 1986 (i.e. 1986 Pop. & Income)	23.1	68.8	11.3	6.9	13.0	1.6
Increased Rail Speed 1986 (100 mph avg.)	23.5	65.8	10.4	11.1	12.7	2.6
Base Case 1991 (i.e. 1991 Pop. & Income)	27.3	66.7	11.7	7.3	14.3	2.0
Increased Rail Speed 1991 (100 mph avg.)	28.0	63.4	11.0	12.1	13.5	3.4

* Includes Origin-destination traffic between the following city pairs: Toronto-Windsor, Toronto-London, Toronto-Ottawa, Toronto-Montreal, Montreal-Quebec City and Ottawa-Montreal.

Note: These simulation runs do not incorporate high fuel price assumption.

Source: Reference 50.

Table V.4

Travel Simulation Results -- The North-East Corridor (U.S.A.)

Run Description	Demand Total (millions)	Demand Business (millions)	Demand Non Business (millions)	Modal Split Auto (%)	Modal Split Air (%)	Modal Split Rail (%)	Modal Split Bus (%)	Rail Demand Total (millions)	Rail Demand Business (millions)	Rail Demand Non Bus. (millions)	Profit (Loss) $ (mill.) (1977 U.S.$)	D.O.C./Pass.Mi. ¢ (1977 U.S. $)
Base Case 1982	101.1	46.0 (45.5%)	55.1 (54.5%)	73.9	5.7	14.5	5.9	14.7	6.8 (46.4%	7.9 (53.6%)	(64.9)	5.4
Higher Density Corridor	304.1	109.1 (35.9%)	195.0 (64.1%)	68.3	6.3	18.5	6.9	56.2	19.8 (35.3%)	36.4 (64.7%)	199.0	3.8
Lower Density Corridor	38.8	17.1 (44.1%)	21.7 (55.9%)	74.5	5.7	13.9	5.9	5.4	2.3 (42.6%)	3.1 (57.4%)	(166.9)	9.2
Increased Rail Speed 1982	103.6	47.8 (46.2%)	55.8 (53.8%)	70.8	5.2	18.4	5.6	19.0	9.6 (50.6%)	9.4 (49.4%)	(2.7)	4.5

Notes: Higher density corridor -- assumes
Lower density corridor -- assumes
Increased rail speed --

Source: Reference 57.

APPENDIX

APPENDIX A - COMPARATIVE TABLES*

Table A-1

FREQUENCIES AND AVERAGE SPEEDS OF RAIL PASSENGER SERVICES WINTER 1977-1978

Average Rail Speed Miles Per Hour		Frequencies Through Trains Per Day		
Tokyo-Osaka	97	Tokyo-Osaka		100
Paris-Bordeaux	91	Hannover-Munich		33
London-Liverpool	79	New York-Washington	28↑	27↓
Rome-Milan	68	Dusseldorf-Stutgart	23↑	21↓
Montreal-Toronto	67	London-Manchester	20↑	21↓
Hannover-Munich	64	Rome-Milan		19
New York-Washington	62	Boston-New York		18
Dusseldorf-Stutgart	60	London-Liverpool	15↑	16↓
Boston-New York	49	Paris-Bordeaux	16↑	14↓
		Montreal-Toronto		6

Table A-2

CORRIDOR INCOME PER CAPITA

Corridor	Income
Northeast Corridor (1975)	$6,830
Dusseldorf-Stuttgart (est. 1976)	6,608
Paris-Bordeaux (1976)	6,128
Hannover-Munich (Est. 1976)	5,900
Tokyo-Osaka (1974)	5,396
Montreal-Toronto (1977)	5,131
London-Manchester/Liverpool (1976)	3,176
Rome-Milan (1975)	2,640

*Zeroes mean that the item doesn't exist; dashes mean that the data was not available. All monetary data are in U.S. dollars.
Reference: 57

Table A-3

CORRIDOR HOUSEHOLDS WITH INCOMES ABOVE $12,500

Corridor	Number
Dusseldorf-Stuttgart (Est. 1976)	4.0 million
Hannover-Munich (Est. 1976)	2.0 million
London-Manchester/Liverpool (1976)	1.4 million
Rome-Milan (1975)	1.3 million
Tokyo-Osaka (1974)	1.3 million
Paris-Bordeaux (Est. 1976)	1.0 million
Montreal-Toronto (Est. 1976)	.5 million
Northeast Corridor	-

Table A-4

PROPORTION OF UPPER INCOME HOUSEHOLDS TO TOTAL

Corridor	Percent
Dusseldorf-Stuttgart (Est. 1976)	43.0
Hannover-Munich (Est. 1976)	41.0
Rome-Milan (1975)	24.4
Paris-Bordeaux (Est. 1976)	21.9
Tokyo-Osaka (1974)	20.9
Montreal-Toronto (Est. 1976)	20.0
London-Manchester/Liverpool (1976)	19.1
Northeast Corridor	-

Reference: 57

Table A-5

AUTO OWNERSHIP PER 100 POPULATION

Corridor	Number
Northeast Corridor (Est. 1977)	45-50
Montreal-Toronto (1975)	40
Paris-Bordeaux (1976)	32
Rome-Milan (1977)	31
Dusseldorf-Stuttgart	30
Hannover-Munich (1976)	29
London-Manchester/Liverpool (1975)	25
Tokyo-Osaka (1975 All Japan)	16

Table A-6

CORRIDOR RAIL PASSENGERS

Corridor	Number	Percent All Passengers
Tokyo-Osaka (1976)	107.5 million	19.3
Rome-Milan (Est. 1976)	26.6 million	34.2
Northeast Corridor (1975)	9.6 million	11.0
Paris-Bordeaux (1977)	9.5 million	-
London-Manchester/Liverpool (1976)	8.6 million	23.0
Hannover-Munich (1977)	6.8 million	-
Montreal-Toronto (1975)	1.1 million	12.5
Dusseldorf-Stuttgart	-	-

Reference: 57

Table A-7

CORRIDOR AIR PASSENGERS

Corridor	Number	Percentage All Passengers
Northeast Corridor (1975)	5.1 million	5.9
Tokyo-Osaka (1976)	2.7 million	.4
Montreal-Toronto (1976)	1.6 million	18.5
Rome-Milan (1976)	1.1 million	1.4
London-Manchester/Liverpool	.6 million	1.5
Paris-Bordeaux (1977)	.4 million	-
Dusseldorf-Stuttgart (1976)	.1 million	-
Hannover-Munich (1976)	.1 million	-

Table A-8

CORRIDOR BUS PASSENGERS

Corridor	Number	Percent All Passengers
Northeast Corridor (1975)	4.4 million	5.0
London-Manchester/Liverpool (1976)	4.1 million	11.0
Tokyo-Osaka (1976)	2.7 million	.4
Montreal-Toronto (1977)	.8 million	9.0
Rome-Milan	0	0
Paris-Bordeaux	0	0
Dusseldorf-Stuttgart	0	0
Hannover-Munich	0	0

Reference: 57

Table A-9

CORRIDOR AUTO PASSENGERS

Corridor	Number	Percent All Passengers
Tokyo-Osaka (1976)	484.7 million	80.0
Northeast Corridor (1975)	68.4 million	78.1
Rome-Milan (Est. 1976)	50.0 million	64.4
London-Manchester/Liverpool (1976)	20.2 million	60.0
Montreal-Toronto (1976)	5.2 million	60.0
Paris-Bordeaux	-	-
Dusseldorf-Stuttgart	-	-
Hannover-Munich	-	-

Table A-10

CORRIDOR RAIL PASSENGER MILES

Corridor	Number	Percent All PPassengers
Tokyo-Osaka (1976)	19.7 billion	57.9
Rome-Milan (1976)	5.2 billion	58.6
Paris-Bordeaux (Est. 1977)	2.7 billion	-
London-Manchester/Liverpool (1976)	1.3 billion	40.4
Northeast Corridor (1975)	1.1 billion	11.6
Hannover-Munich (1977)	1.0 billion	-
Montreal-Toronto (1975)	.4 billion	18.6
Dusseldorf-Stuttgart	-	-

Reference: 57

Table A-11

CORRIDOR AIR PASSENGER MILES

Corridor	Number	Percent All Passengers
Northeast Corridor (1975)	1.3 billion	13.7
Tokyo-Osaka (1976)	.9 billion	2.3
Montreal-Toronto (1976)	.5 billion	33.6
Rome-Milan (1976)	.3 billion	3.5
Paris-Bordeaux (1977)	.1 billion	-
London-Manchester/Liverpool (1975)	.09 billion	2.9
Hannover-Munich (1976)	.03 billion	-
Dusseldorf-Stuttgart (1976)	.03 billion	-

Table A-12

CORRIDOR BUS PASSENGER MILES

Corridor	Number	Percent All Passengers
Northeast Corridor (1975)	600 million	6.3
London-Manchester/Liverpool (1976)	308 million	9.6
Tokyo-Osaka (1975)	264 million	.7
Montreal-Toronto (1977)	116 million	7.7
Paris-Bordeaux	0	0
Dusseldorf-Stuttgart	0	-
Hannover-Munich	0	-
Rome-Milan		0

Reference: 57

Table A-13

CORRIDOR AUTO PASSENGER MILES

Corridor	Number	Percent All Passengers
Tokyo-Osaka (1974)	14.3 billion	39.1
Northeast Corridor (1975)	6.5 billion	68.4
Rome-Milan (1976)	3.4 billion	38.1
London-Manchester/Liverpool (Est. 1976)	1.5 billion	47.1
Montreal-Toronto (Est. 1976)	.6 billion	40.0
Paris-Bordeaux	-	-
Dusseldorf-Stuttgart	-	-
Hannover-Munich	-	-

Table A-14

PROPORTION CORRIDOR RAIL PASSENGERS
TO CORRIDOR POPULATION*

Corridor	Percent
Tokyo-Osaka	187
Rome-Milan	155
Paris-Bordeaux	86
Hannover-Munich	58
London-Manchester/Liverpool	46
Northeast Corridor	30
Montreal-Toronto	13
Dusseldorf-Stuttgart	-

* This table is based on earlier ones with varying years shown.

Reference: 57

Table A-15

CORRIDOR RAIL PASSENGER MILES PER CAPITA CORRIDOR POPULATION*

Corridor	Miles
Tokyo-Osaka	343
Rome-Milan	303
Paris-Bordeaux	245
Hannover-Munich	83
London-Manchester/Liverpool	70
Montreal-Toronto	45
Northeast Corridor	32
Dusseldorf-Stuttgart	-

* This table is based on earlier ones with varying years shown.

Table A-16

PROPORTION CORRIDOR AIR PASSENGERS TO CORRIDOR POPULATION*

Corridor	Percent
Montreal-Toronto	18.8
Northeast Corridor	15.7
Rome-Milan	6.4
Tokyo-Osaka	4.0
Paris-Bordeaux	4.0
London-Manchester/Liverpool	3.2
Hannover-Munich	.8
Dusseldorf-Stuttgart	.4

* This table is based on earlier ones with varying years shown.
Reference: 57

Table A-17

CORRIDOR AIR PASSENGER MILES PER CAPITA CORRIDOR POPULATION*

Corridor	Miles
Montreal-Toronto	59
Northeast Corridor	40
Rome-Milan	17
Tokyo-Osaka	16
Paris-Bordeaux	11
London-Manchester/Liverpool	5
Hannover-Munich	3
Dusseldorf-Stuttgart	1

* This table is based on earlier ones with varying years shown.

Table A-18

PROPORTION CORRIDOR BUS PASSENGER TO CORRIDOR POPULATION*

Corridor	Percent
London-Manchester/Liverpool	22.2
Northeast Corridor	13.6
Montreal-Toronto	9.4
Tokyo-Osaka	4.7
Rome-Milan	0
Paris-Bordeaux	0
Dusseldorf-Stuttgart	0
Hannover-Munich	0

* This table is based on earlier ones with varying years shown.

Reference: 57

Table A-19

CORRIDOR BUS PASSENGER MILES PER CAPITA CORRIDOR POPULATION*

Corridor	Miles
Norhteast Corridor	19
London-Manchester/Liverpool	17
Montreal-Toronto	14
Tokyo-Osaka	5
Rome-Milan	0
Paris-Bordeaux	0
Dusseldorf-Stuttgart	0
Hannover-Munich	0

* This table is based on earlier ones with varying years shown.

Table A-20

PROPORTION CORRIDOR AUTO PASSENGERS TO CORRIDOR POPULATION*

Corridor	Percent
Tokyo-Osaka	843
Rome-Milan	290
Northeast Corridor	211
London-Manchester/Liverpool	109
Montreal-Toronto	61
Paris-Bordeaux	-
Dusseldorf-Stuttgart	-
Hannover-Munich	-

* This table is based on earlier ones with varying years shown.
Reference: 57

Table A-21

CORRIDOR AUTO PASSENGER MILES PER CAPITA CORRIDOR POPULATION*

Corridor	Miles
Tokyo-Osaka	249
Rome-Milan	198
Northeast Corridor	201
London-Manchester/Liverpool	81
Montreal-Toronto	71
Paris-Bordeaux	-
Dusseldorf-Stuttgart	-
Hannover-Munich	-

* This table is based on earlier ones with varying years shown.

Table A-22

MAXIMUM RAIL SPEED WINTER 1977-78

Corridor	Miles Per Hour
Tokyo-Osaka	126
Paris-Bordeaux	125
Rome-Milan	125
New York-Washington	111
London-Manchester/Liverpool	105
Dusseldorf-Stuttgart	100
Hannover-Munich	100
Montreal-Toronto	95
Boston-New York	79

Reference: 57

Table A-23

FREQUENCIES
AIR PER DAY
WINTER 1977-78

Corridor	Number	
New York-Washington	152	
Boston-New York	114	
Rome-Milan	25	
Montreal -Toronto	20↑	21↓
Hannover-Munich	16	
Tokyo-Osaka	10	
London-Manchester	9↑	10↓
Paris-Bordeaux	9	
Dusseldorf-Stuttgart	-	

Table A-24

FREQUENCIES
THROUGH BUSES PER DAY
WINTER 1977-1978

Corridor	Number
New York-Washington	133
Boston-New York	74
Tokyo-Osaka	15
London-Manchester	8
Montreal-Toronto	8
Paris-Bordeaux	0
Rome-Milan	0
Dusseldorf-Stuttgart	0
Hannover-Munich	0

Reference: 57

Table A-25

CORRIDOR RAIL PASSENGER REVENUES

Corridor	Million
Tokyo-Osaka (1976)	$1,568.0
Rome-Milan (1976)	153.0
Paris-Bordeaux (1976)	95.0
Northeast Corridor (1976)	91.3
London-Manchester/Liverpool (Est. 1976)	69.0
Montreal-Toronto (1975)	15.0
Dusseldorf-Stuttgart	-
Hannover-Munich	-

Table A-26

CORRIDOR RAIL NET REVENUES

Corridor	Million
Tokyo-Osaka (1976)	$ 851.0
Paris-Bordeaux (1976)	5.0
London-Manchester/Liverpool (Est. 1976)	(16.5)
Montreal-Toronto (1975)	(18.2)
Northeast Corridor (1976)	(81.9)
Rome-Milan (1976)	(95.0)
Dusseldorf-Stuttgart	-
Hannover-Munich	-

Reference: 57

Table A-27

RAIL OPERATING RATIO

Corridor	Percent
Tokyo-Osaka (1976)	46.0
Paris-Bordeaux (1976)	95.0
London-Manchester/Liverpool (Est. 1976)	124.0
Rome-Milan (1976)	161.0
Northeast Corridor (1976)	190.7
Montreal-Toronto (1975)	223.0
Dusseldorf-Stuttgart	-
Hannover-Munich	-

Table A-28

CORRIDOR RAIL LOAD FACTORS

Corridor	Percent
Tokyo-Osaka (1975)	66.0
Paris-Bordeaux (1976)	50.0
Montreal-Toronto (1975)	49.7
Northeast Corridor (1977)	47.1
Rome-Milan (1976)	45.0
London-Manchester/Liverpool (Est. 1976)	35.0
Dusseldorf-Stuttgart	-
Hannover-Munich	-

Reference: 57

Table A-29

CORRIDOR AIR LOAD FACTORS

Corridor	Percent
Tokyo-Osaka (1975)	80
Paris-Bordeaux (1977)	67
Montreal-Toronto (Est. 1976)	60
Rome-Milan (1976)	56
London-Manchester/Liverpool (Est. 1976)	55
Northeast Corridor	55
Dusseldorf-Stuttgart	-
Hannover-Munich	-

Reference: 57

Table A-30

CORRIDOR RAIL FARES CENTS PER MILE

50 Miles Corridor	Class	Cents	150 Miles Corridor	Class	Cents	300 Miles Corridor	Class	Cents
Tokyo-Osaka	2d	19.0	London-Manchester/ Liverpool	1st	17.1	Tokyo-Osaka		11.2
				2d	11.9			
London-Manchester-Liverpool	1st	16.8				Dusseldorf-Stuttgart	1st	17.5
	2d	11.9	Tokyo-Osaka	2d	11.3		2d	10.6
Northeast Corridor	2d	11.7	Dusseldorf/ Stuttgart	1st	19.0	Hannover-Munich	1st	17.5
				2d	11.3			
Montreal-Toronto	2d	8.0	Hannover-Munich	1st	19.0	London-Manchester/ Liverpool	1st	14.2
				2d	11.3		2d	10.5
Rome-Milan	2d	3.1						
Dusseldorf-Stuttgart		-	Northeast Corridor	2d	9.6	Northeast Corridor	2d	9.8
Hannover-Munich		-	Paris-Bordeaux	1st	9.9	Paris-Bordeaux	1st	9.5
				2d	6.6		2d	6.4
Paris-Bordeaux		-						
			Montreal-Toronto	2d	6.0	Montreal-Toronto	2d	6.0
			Rome-Milan	2d	3.1	Rome-Milan	2d	3.0

Reference: 57

Table A-31

CORRIDOR BUS FARES CENTS PER MILE

50 Miles		150 Miles		300 Miles	
Corridor	Cents	Corridor	Cents	Corridor	Cents
Northeast Corridor	10.3	Northeast Corridor	9.4	Northeast Corridor	8.0
Montreal-Toronto	8.0	Tokyo-Osaka	6.4	Tokyo-Osaka	7.0
Tokyo-Osaka	7.0	London-Manchester/ Liverpool	5.4	Montreal-Toronto	4.5
London-Manchester/ Liverpool	5.6	Montreal-Toronto	5.0	London-Manchester/ Liverpool	4.1
Paris-Bordeaux	0	Paris-Bordeaux	0	Paris-Bordeaux	0
Dusseldorf-Stuttgart	0	Dusseldorf-Stuttgart	0	Dusseldorf-Stuttgart	0
Hannover-Munich	0	Hannover-Munich	0	Hannover-Munich	0
Rome-Milan	0	Rome-Milan	0	Rome-Milan	0

Reference: 57

Table A-32

CORRIDOR AIR FARES
WINTER 1977-1978
300 Miles

Corridor	Cents Per Mile
Dusseldorf-Stuttgart	33.8¢
Hannover-Munich	33.8
Paris-Bordeaux	22.4
Northeast Corridor	19.0
London-Manchester/Liverpool	18.6
Montreal-Toronto	16.7
Tokyo-Osaka	18.0
Rome-Milan	13.5

Table A-33

RAIL OPERATING EXPENSES

Corridor	Cents Per Seat Mile
Northeast Corridor (1977)	8.20
Montreal-Toronto (1975)	5.9
London-Manchester/Liverpool (Est. 1976)	6.6
Tokyo-Osaka (1976)	2.8
Paris-Bordeaux (Est. 1975)	2.1
Rome-Milan (1976)	2.0
Dusseldorf-Stuttgart	-
Hannover-Munich	-

Reference: 57

Table A-34

AIR OPERATING EXPENSES

Corridor	Cents Per Seat Mile
Paris-Bordeaux (Est. 1977)	9.4¢
Northeast Corridor	7.1
Rome-Milan (1976)	5.3
Montreal-Toronto (1976)	4.7
London-Manchester/Liverpool	-
Tokyo-Osaka	-
Dusseldorf-Stuttgart	-
Hannover-Munich	-

Table A-35

PRICE OF GASOLINE PER U.S. GALLON

Corridor	
Rome-Milan (1977)	$2.67 Regular
Tokyo-Osaka (1977)	2.07 Regular
Paris-Bordeaux (1977)	1.95 Premium 1.79 Regular
London-Manchester/Liverpool (1977)	1.87 Premium
Dusseldorf-Stuttgart (1977)	1.57 Regular
Hannover-Munich (1977)	1.57 Regular
Montreal-Toronto (1977)	.78 Regular
Northeast Corridor (1977)	.675 Composite

Reference: 57

Table A-36

GASOLINE TAX PER U.S. GALLON

Corridor	
Rome-Milan (1977)	$1.96
Paris-Bordeaux (1977)	0.90
Tokyo-Osaka (1977)	0.79
London-Manchester/Liverpool (1977)	0.72
usseldorf-Stuttgart (1977)	0.52
Hannover-Munich (1977)	0.53
Montreal-Toronto (1977)	0.25
Northeast Corridor (1977)	0.12- 0.15

Table A-37

AUTO OPERATING COST

Corridor	Cost Per Mile
Tokyo-Osaka (1976)	50.0¢
London-Manchester/Liverpool (1977)	26.6
Paris-Bordeaux (1977)	24.1
Rome-Milan (1977)	23.0
Montreal-Toronto (1977)	18.6
Northeast Corridor (1977)	17.0
Dusseldorf-Stuttgart	-
Hannover-Munich	-

Reference: 57